Mathematics

At Wroxall we have developed a mastery approach to the way we plan, teach and assess Mathematics. One of the fundamental principles behind a mastery curriculum is that all pupils should be challenged to understand more deeply. Incorporating skilful questioning within whole class teaching allows all children to be part of the learning experience and have the opportunity to make the connections and links across mathematical areas.

Lesson structure

Lessons are broadly structured in 3 parts:

1. Cold Task and whole class introduction - This is an opportunity for learners to showcase what they already know and for the teacher to extend their understanding through careful questioning and examples. This will look different across key stages and classes- it may be a short quiz, use of concrete resources or one question to gage their understanding. Often learners will be exploring a range of concrete resources to support their thinking, concept building and explanations. Cold tasks are then used to inform teaching and starting points on learning journeys for different children.

2. Guided practice – In this part, learners practise the newly explored ideas and review them together as a class. This part is also characterised by lots of discussion. This practice may be with part of the class or small groups depending on the 'need' of the children and informed by the cold task.

3. Independent practice – This is where learners will apply their learning. During this time, the teacher or LSA may be observed working with a group who have been identified as requiring further support or a deepening of their understanding using a challenge task. All children have the opportunity to apply their learning to a wider range of contexts or a new reasoning or problem solving challenge.

4. Hot Task- Children have the opportunity to showcase what they have learnt during the topic/domain. This usually takes place 2-3 weeks after the topic has been taught; this way it tests their retrieval skills and collates an accurate judgement of the progress they have made.

How we teach Mathematics

The following are key elements of our teaching:

· **Multiple models**. To help learners become better method creators, connection makers and critical thinkers, we believe it is essential that their experiences should not be limited to the simplest form of a concept. We

encourage exploration and comparison of multiple models/examples and also introducing the idea of identifying and comparing non-examples so that learners may better understand a concept through exploring what it is as well as what it is not. This approach encourages deeper understanding as well as the making of connections between concepts. Fundamental to this is consistent use of a Concrete-Pictoral-Abstract (CPA) approach, detailed below.

· **Step-by-step approach**

The journey through each lesson is built on logical steps with the idea that all children access the learning. Those who are 'early graspers' may be given opportunities to extend their thinking and deepen their understanding.

· **Resources and pictures**

As our curriculum is based upon the CPA (concrete-pictorial-abstract) model, a huge investment in resources has been made. Teachers model ways of solving questions and problems through the use of concrete resources, and pictorial representations. These materials are used to support concept building and reasoning through 'active participation'. Children then move to the 'seeing' stage, known as the pictorial stage. This encourages them to make a mental connection between the physical object and abstract levels of understanding by drawing or using pictures, circles, diagrams or models which represent the objects in the problem. In every session, appropriate concrete resources are available for the pupils.

· **Questions**

To challenge thinking, teachers use questioning throughout every lesson to check understanding and prompt thinking. A variety of questions are used some commonly used ones are: 'How do you know? Can you prove it? Are you sure? What's the value? What's the same/different about? Can you explain…? What does your partner think? Can you imagine…? My friend says… Do you agree? More complex questions are also used to challenge learners who have grasped the concept earlier. Learners are expected to listen to each other's responses and may be asked to explain someone else's ideas in their own words, or if they agree/disagree etc. These question and sentence stems are displayed on working walls to embed successful practice with pupils, and give them guidance and frameworks for their responses.

· **Talk Discussion**

This a powerful and essential element of each lesson as it provides the testing ground for ideas to be more fully explored. Learners have frequent opportunities to talk to their partners so that they may explain/clarify their thinking throughout the lesson, but are expected to complete written work independently (unless working in a guided group with the teacher).

· **Reasoning**

We understand that developing strong reasoning skills is a complex but essential process. The modelling of verbal and written reasoning is essential if children are to be able to explain their ideas effectively.

· Promoting deep understanding

Deep understanding is achieved through a combination of the above. Some learners may be identified as having grasped concepts more quickly than others and will be given opportunities for further challenge through deepening tasks. These are opportunities to explore the same concept that the rest of the class are exploring but at a deeper level, requiring learners to demonstrate greater creativity and imagination. They will also be given opportunities to independently explore and investigate mathematical contexts and structures, communicate results clearly and to systematically explain and generalise the Mathematics.

Curriculum coverage in Mathematics ·

Within each academic year, children will study a range of Mathematics topics.

In both Key Stage 1 and Key Stage 2, children are taught Mathematics as a freestanding subject, covering specific topics each term. We use the HIAS primary mixed age planning framework as the basis for our maths planning. This approach links to the Key Stage 1 and Key Stage 2 National Curriculum, and how it makes progress through the topics. The progression helps class teachers see what to cover for each year group and what is taught in other years. Maths subject leaders and senior leaders gain an overview of the whole Primary phase to see how topics are developed over time, and the resources needed. The table below shows the Mathematics topics that are currently delivered. As our classes are currently organised into mixed age-groups, we use the HIAS long term plans (examples below), and the medium term plans, which are adapted for mixed-age classes. The HIAS model is a spiral curriculum, where topics are regularly revisited and pupils' knowledge, skills and understanding are developed. Additional resources are used to enhance the planning from the HIAS units.

Year 1 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Autumn	1.1 Number: Place Value			1.1 Addition and subtraction	1.2 Measurement Money / length	1.2 Addition and subtraction		1.3 Multiplication and division (2s)		1.3 Fractions and geometry	1.4 Number: Place Value	1.4 Addition and subtraction		
	Measurement: Utilise everyday opportunities to develop understanding of the passing of time (hours) and 'time' language (yesterday, tomorrow, morning, afternoon, evening) and comparative language (quicker, slower etc). Introduce days of the week ,months and dates													
Spring	1.5 Addition and subtraction			1.5 Measurement Time and mass	1.6 Fractions and geometry	1.6 Multiplication and division		1.7 Number and PV	1.7 Subtraction and addition		1.8 Addition and subtraction with money		1.9 Addition and subtraction with mass	
	Measurement: Utilise everyday opportunities to develop understanding of the passing of time (hours and half-hours)													
Summer	1.10 Multiplication and division				1.11 Geometry	1.12 Number: Place Value Addition and subtraction				1.13 Fractions with multiplication and division	1.14 Measurement: Time, capacity and volume		1.15 Geometry	

Year 2 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Autumn	2.1 Number: Place Value	2.1 Addition and Subtraction			2.2 Measurement: Money		2.2 Addition and subtraction	2.3 Multiplication and division		2.3 Fractions and geometry	2.4 Number: Place Value with addition and subtraction			2.4 Statistics
	Measurement: Time : Utilise everyday opportunities to tell the time and develop the days of the week and the months of the year. Calculation: Utilise everyday contexts to increase fluency with mental strategies using number facts to 20													
Spring	2.5 Addition and subtraction		2.5 Measurement: Mass and time		2.6 Fractions and geometry	2.6 Multiplication and division		2.7 Number and PV with Addition and Subtraction		2.7 Statistics	2.8 Addition and subtraction with money	2.8 Fractions	2.9 Measurement with geometry	2.9 Addition and subtraction
	Measurement: Time: Utilise everyday opportunities to tell the time and develop knowledge of 24 hours in a day and 60 minutes in an hour													
Summer	2.10 Multiplication and division				2.11 Statutory Tests	2.12 Number: Place Value Addition and subtraction				2.13 Fractions with multiplication and division		2.14 Measure		2.15 Geometry

Example of the HIAS medium term plan for mixed-age classes across years 1 and 2;

Y1/2 Units		Hours	Domain	Y1 objectives	Y2 objectives
1.1	2.1	20	Number & Place Value Addition and Subtraction	• Given a number, identify one more and one less. • Identify and represent numbers using objects • Read numbers from 1 to 20 in numerals • Partition 5 into two parts and solve problems with number bonds to 5	• Count to and across 100, forwards and backwards, from any given number • Count in 10s to and from 100 • Estimate numbers using concrete resources and relative position on a number line • Read and write numbers to at least 100 in numerals and words • Compare and order numbers up to 100, including consecutive numbers, odds and evens and step counting in 2s,5s and 10s, using <, > and = signs • Given a number, identify ten more and ten less • Identify and represent numbers on a number line • Partition any number up to 10 in different ways, recording pictorially • Use a context to solve problems involving number bonds to 20 .

Year 3 – Yearly Overview   Hampshire Services   HIAS MOODLE+ RESOURCE

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Autumn	3.1 Number: Place Value Addition and Subtraction			3.2 Addition and subtraction with Measurement (Money, Length)		3.3 Multiplication and Division		3.4 Fractions and Geometry				3.5 Number: Place Value with Measurement (Length, Mass, Time)		
	Measurement: Time : Utilise everyday opportunities to tell the time from an analogue clock. Use the vocabulary of time (am/pm; morning/afternoon; noon/midnight. Know the number of days in each month, year and leap year													
Spring	3.6 Fractions and Geometry				3.7 Subtraction and addition			3.8 Measurement: Time	3.9 Multiplication and Division with Fractions (To include times tables)			3.10 Subtraction and addition with statistics Measurement (volume, capacity and scales)		
	Measurement: Time: Utilise everyday opportunities to tell the time, including on a clock face with Roman numerals. Number: Practise counting in multiples of 3, 4 and 50 , and in 100s from any number.													
Summer	3.11 Multiplication and division			3.12 Geometry		3.13 Addition and subtraction		3.14 Multiplication and Division with Fractions			3.15 Measurement (Money, Time)		3.16 Measurement (Length)	

Year 4 – Yearly Overview

HIAS MOODLE+ RESOURCE

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Autumn	4.1 Number: Place Value Addition and Subtraction			4.2 Addition and subtraction with Measurement (Money, Length)		4.3 Multiplication and Division		4.4 Fractions and Geometry				4.5 Number: Place Value with Measurement (Length, Mass, Time)	
	Measurement: Time : Utilise everyday opportunities to tell the time from an analogue clock and a 24-hour clock. Estimate and read time with increasing accuracy to the nearest minute. Convert from hours to minutes, minutes to seconds, years to months, weeks to days.													
Spring	4.6 Fractions and Geometry			4.7 Subtraction and addition			4.8 Measurement: Time	4.9 Multiplication and Division with Fractions (To include times tables)			4.10 Subtraction and addition with statistics Measurement (volume, capacity and scales)		
	Measurement: Time: Utilise everyday opportunities to tell the time, including on a clock face with Roman numerals. Convert to 12-hour and 24-hour time. Read Roman numerals to 100 (C). Practise counting in multiples of 25 and 1000 from zero													
Summer	4.11 Multiplication and division				4.12 Geometry		4.13 Addition and subtraction with statistics		4.14 Multiplication and Division with Fractions			4.15 Measurement (Money, Time)		4.16 Measurement (Length)	

Example of the HIAS medium term plan for mixed-age classes across years 3 and 4;

Y3/4 Units		Hours	Domain	Y3 objectives	Y4 objectives
3.1	4.1	15	Number & Place Value Addition and Subtraction	• Recognise the place value of each digit in 3-digit numbers (100s, 10s and ones) up to 1000 • Identify, represent, and estimate numbers using different representations such as number lines • Find 10 or 100 more or less • Round any number to the nearest 10, 100 • Recall and use addition and subtraction facts to 20 fluently and derive facts to 100 (Y2) • Compare and order numbers using < , > , = signs (Y2) • Read and write numbers to at least 100 in numerals and in words. • Add and subtract numbers mentally including a 3-digit number and ones , tens, and hundreds. • Estimate the answer to a calculation and use inverse operations to check answers	• Recognise the place value of each digit in 4-digit numbers (1000s, 100s, 10s and ones) up to 10,000 • Identify, represent, and estimate numbers using different representations such as number lines • Find 10, 100 or 1000 more or less • Round any number to the nearest 10, 100, 1000 • Recall and use addition and subtraction facts to 20 fluently and derive facts to 100 (Y2) • Compare and order numbers up to 1000 using < , > , = signs (Y3) • Add and subtract numbers mentally including a 3-digit number and ones , tens, and hundreds. (Y3) • Estimate the answer to a calculation and use inverse operations to check answers • Solve addition and subtraction two-step problems in contexts, deciding which operations to use and why

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Autumn	5.1 Number: Place Value Addition and Subtraction (length)			5.2 Multiplication and Division Measurement (Area and arrays)			5.3 Fractions	5.4 Fractions and Geometry Measurement (time)				5.5 Number: Place Value with Measurement (Mass, Capacity) and all four operations		
	Measurement: Utilise everyday opportunities to convert units using place value understanding and knowledge of tables facts													
Spring	5.6 Fractions (%) and Geometry			5.7 Subtraction and addition (whole numbers and fractions)			5.8 Statistics	5.9 Fractions with Measurement (volume, capacity, metric and imperial)			5.10 Subtraction and addition (mental strategies)		5.11 Multiplication and division (tables and related facts)	
	Measurement: Utilise everyday opportunities to convert units using place value understanding and knowledge of tables facts. Practise mental strategies using facts, related derived facts and place value knowledge such as adding 99 , adding 0.99, near doubles etc.													
Summer	5.12 Multiplication and division		5.13 Geometry	5.14 All four operations (mixed problem solving)		5.15 Addition and subtraction (secure formal)		5.16 Fractions (%) with geometry			5.17 Multiplication and division (secure formal)		5.18 All four operations with decimals and measure	

Example of the HIAS medium term plan for mixed-age classes across years 4 and 5;

Y4/5 Units		Hours	Domain	Y4 objectives	Y5 objectives
4.1	5.1	15	Number & Place Value Addition and Subtraction (context length including perimeter)	• Recognise the place value of each digit in 4-digit numbers (1000s, 100s, 10s and ones) up to 10,000 • Identify, represent, and estimate numbers using different representations such as number lines • Find 10, 100 or 1000 more or less • Round any number to the nearest 10, 100, 1000 • Recall and use addition and subtraction facts to 20 fluently and derive facts to 100 (Y2) • Compare and order numbers up to 1000 using < , > , = signs (Y3) • Add and subtract numbers mentally including a 3-digit number and ones , tens, and hundreds. (Y3) • Estimate the answer to a calculation and use inverse operations to check answers • Solve addition and subtraction two-step problems in contexts, deciding which operations to use and why	• Read, write, order and compare numbers to at least 100,000 and determine the value of each digit • Identify, represent and estimate numbers using different representations • Round any number to the nearest 10,100,1000, 10 000 and 100 000 • Add and subtract whole numbers with more than four digits using informal and formal written methods • Use rounding to check answers and determine, in the context of the problem, the level of accuracy. • Solve addition and subtraction multi-step problems, deciding which operations to use and why • Measure and calculate the perimeter of composite rectilinear shapes in cm and m • Use all four operations to solve problems involving length, using decimal notation

Year 6 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Autumn	6.1 Number: Place Value Addition and Subtraction (length and equations)			6.2 Multiplication and Division (with equations)			6.3 Fractions	6.4 Percentages and Geometry (angle and circles) with measurement (time)				6.5 Number: Place Value with Measurement (Mass, Capacity) and all four operations		
	Utilise everyday opportunities to develop fluency with a broad range of arithmetic strategies in the context of the current unit of work. Revise and consolidate key facts for measurement and conversion of units of measure.													
Spring	6.6 Fractions with Ratio and Geometry			6.7 Subtraction and addition (whole numbers and fractions) with linear sequences			6.8 Statistics	6.9 Algebra and formulae with Measurement (volume, capacity, metric and imperial)			6.10 All four operations with statistics (formal and informal methods)		6.11 Geometry with fractions	
	Utilise everyday opportunities to develop fluency with a broad range of arithmetic strategies in the context of the current unit of work. Revise and consolidate key facts for measurement and conversion of units of measure.													
Summer	6.12 Multiplication and division with squares, cubes and primes			6.13 Statutory Tests	6.14 Fractions and equivalence	6.15 All four operations (whole numbers and fractions)		6.16 Geometry with fractions, ratio and proportion			6.17 Multiplication and division (secure formal)		6.18 All four operations with decimals and measure	

Example of the HIAS medium term plan for mixed-age classes across years 5 and 6;

Y5/6 Units		Hours	Domains	Year 5 objectives	Year 6 objectives
5.1	6.1	15	Number & place value Addition and subtraction (measurement: length including perimeter)	• Read, write, order and compare numbers to at least 100,000 and determine the value of each digit • Identify, represent, and estimate numbers using different representations • Round any number to the nearest 10,100,1000, 10 000 and 100 000 • Add and subtract whole numbers with more than four digits using informal and formal written methods • Use rounding to check answers and determine, in the context of the problem, the level of accuracy. • Solve addition and subtraction multi-step problems, deciding which operations to use and why • Measure and calculate the perimeter of composite rectilinear shapes in cm and m • Use all four operations to solve problems involving length, using decimal notation	• Read, write, and compare numbers to at least 10,000,000 and determine the value of each digit • Identify, represent, and estimate numbers using different representations including number lines • Round any whole number to a required degree of accuracy • Add and subtract whole numbers with more than 4 digits using informal and formal written methods as appropriate • Perform mental calculations, including with mixed operations and large numbers • Use estimation to check answers to calculations and determine, in the context of a problems, levels of accuracy • Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why • Measure and calculate the perimeter of composite rectilinear shapes in cm and m • Recognise shapes with the same area can have different perimeters and vice versa • Use knowledge of order of operations to carry out calculation involving the four operations

Progression of skills in Mathematics

Through the mixed age planning units above, a progression of skills will be taught as outlined below.

Year 1 Overview

Number and Place Value

- Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- Count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens, given a number, identify one more and one less
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
- Read and write numbers from 1 to 20 in numerals and words.

Addition and Subtraction

- Read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs
- Represent and use number bonds and related subtraction facts within 20
- add and subtract 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, and missing number problems such as 7 = □ − 9.

Multiplication and Division

- 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.

- Fractions (including decimals and percentages)
- Recognise, find and name a half as one of two equal parts of an object, shape or quantity
- Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity

Measurement

- Compare, describe and solve practical problems for:
  - lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]

  - mass/weight [for example, heavy/light, heavier than, lighter than]

  - capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]

  - time [for example, quicker, slower, earlier, later]

- Measure and begin to record the following:
  - lengths and heights

  - mass/weight

  - capacity and volume

  - time (hours, minutes, seconds)

- Recognise and know the value of different denominations of coins and notes
- 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 the time to the hour and half past the hour and draw the hands on a clock face to show these times.

Geometry - properties of space

- Recognise and name common 2-D and 3-D shapes, including:
  - 2-D shapes [for example, rectangles (including squares), circles and triangles]

  - 3-D shapes [for example, cuboids (including cubes), pyramids and spheres].

Geometry - position and direction

- Describe position, direction and movement, including whole, half, quarter and three-quarter turns.

Year 2 Overview

Number and Place Value

- Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- Recognise the place value of each digit in a two-digit number (tens, ones)
- Identify, represent and estimate numbers using different representations, including the number line
- Compare and order numbers from 0 up to 100; use <, > and = signs
- Read and write numbers to at least 100 in numerals and in words
- Use place value and number facts to solve problems.

Addition and Subtraction

- 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

- Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 10
- Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  - a 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) and subtraction of one number from another cannot
- Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Multiplication and Division

- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Fractions (including decimals and percentages)
- Recognise, find, name and write fractions ⅓, ¼, ¾ and ¾ of a length, shape, set of objects or quantity
- Write simple fractions e.g. ½ of 6 = 3 and recognise the equivalence of two quarters and one half.

Measurement

- Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels
- Compare and order lengths, mass, volume/capacity and record the results using >, < and =
- Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value
- Find different combinations of coins that equal the same amounts of money
- Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change
- 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 a clock face to show these times
- Know the number of minutes in an hour and the number of hours in a day.

Geometry - properties of space

- Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
- Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- Identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a
- pyramid]
- Compare and sort common 2-D and 3-D shapes and everyday objects.

Geometry - position and direction

- 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 anti-clockwise).

Statistics

- Interpret and construct simple pictograms, tally charts, block diagrams and simple tables
- Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity
- Ask and answer questions about totalling and comparing categorical data.

Year 3 Overview

Number and Place Value

- Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- Compare and order numbers up to 1000
- Identify, represent and estimate numbers using different representations
- Read and write numbers up to 1000 in numerals and in words
- Solve number problems and practical problems involving these ideas.

Addition and Subtraction

- Add and subtract numbers mentally, including:
  - a three-digit number and ones

  - a three-digit number and tens

  - a three-digit number and hundreds

- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and 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 complex addition and subtraction.

Multiplication and Division

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- 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
- 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.

Fractions (including decimals and percentages)

- Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
- Recognise and show, using diagrams, equivalent fractions with small denominators
- Add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$
- Compare and order unit fractions, and fractions with the same denominator
- Solve problems that involve all of the above.

Measurement

- Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
- Measure the perimeter of simple 2-D shapes
  Add and subtract amounts of money to give change, using both £ and p in practical contexts
- 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, a.m./p.m., morning, afternoon, noon and midnight
- Know the number of seconds in a minute and the number of days in each month, year and leap year
- Compare durations of events [for example to calculate the time taken by particular events or tasks].

Geometry - properties of space

- Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them
- Recognise angles as a property of shape or a description of a turn

- Identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle
- Identify horizontal and vertical lines and pairs of perpendicular and parallel lines.

Statistics

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.

Year 4 Overview

Number and Place Value

- Count in multiples of 6, 7, 9, 25 and 1000
- Find 1000 more or less than a given number
- Count backwards through zero to include negative numbers
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- Order and compare numbers beyond 1000
- Identify, represent and estimate numbers using different representations
- Round any number to the nearest 10, 100 or 1000
- Solve number and practical problems that involve all of the above and with increasingly large positive numbers
- 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.

Addition and Subtraction

- Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- Estimate and use inverse operations to check answers to a calculation
- Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Multiplication and Division

- Recall multiplication and division facts for multiplication tables up to 12 × 12
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- Recognise and use factor pairs and commutativity in mental calculations
- Multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- Solve problems involving multiplying and adding, 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.

Fractions (including decimals and percentages)

- Recognise and show, using diagrams, families of common equivalent fractions
- Count up and down in hundredths; recognise that hundredths arise when dividing an object by one
- hundred and dividing tenths by ten.
- Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number
- Add and subtract fractions with the same denominator
- Recognise and write decimal equivalents of any number of tenths or hundredths
- Recognise and write decimal equivalents to ¼, ½, ¾

- Find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths
- 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
- Solve simple measure and money problems involving fractions and decimals to two decimal places.

Measurement

- Convert between different units of measure [for example, kilometre to metre; hour to minute
- Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres
- Find the area of rectilinear shapes by counting squares
- Estimate, compare and calculate different measures, including money in pounds and pence
- 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.

Geometry - properties of space

- Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes
- Identify acute and obtuse angles and compare and order angles up to two right angles by size
- Identify lines of symmetry in 2-D shapes presented in different orientations
- Complete a simple symmetric figure with respect to a specific line of symmetry.

Geometry - position and direction

- Describe positions on a 2-D 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 complete a given polygon.

Statistics

- Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.
- Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.

Year 5 Overview

Number and Place Value

- Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- Solve number problems and practical problems that involve all of the above
- Read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Addition and Subtraction

- Add and subtract whole numbers with more than 4 digits, including using formal written method (columnar addition and subtraction)
- Add and 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 addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Multiplication and Division

- Identify multiples and factors:
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 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 up to 4 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 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000
- Recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})
- Solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes
- Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- Solve problems involving multiplication and division, including scaling by simple fractions and problem involving simple rates

Fractions (including decimals and percentages)

- Compare and order fractions whose denominators are all multiples of the same number
- Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements >1 as a mixed number[for example,$\frac{2}{5}+\frac{4}{5} = \frac{6}{5}= 1\frac{1}{5}$]
- Add and subtract fractions with the same denominator and denominators that are multiples of the same number
- Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- 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
- 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
- Solve problems involving number up to three decimal places
- Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- Solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2},\frac{1}{4},\frac{1}{5},\frac{2}{5}$ and those fractions with a denominator of a multiple of 10 or 25.

Measurement

- Convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
- Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes

- Estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water]
- Solve problems involving converting between units of time
- Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

Geometry - properties of space

- Identify 3-D shapes, including cubes and other cuboids, from 2-D representations
- Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles
- Draw given angles, and measure them in degrees (°)
- identify:
  - angles at a point and one whole turn (total 360°)

  - angles at a point on a straight line and ½ a turn (total 180°)

  - other multiples of 90°

- Use the properties of rectangles to deduce related facts and find missing lengths and angles
- Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.

Geometry - position and direction

- 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.

Statistics

- Solve comparison, sum and difference problems using information presented in a line graph
- Complete, read and interpret information in tables, including timetables.

Year 6 Overview

Number – number and place value

- Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
- Round any whole number to a required degree of accuracy
- Use negative numbers in context, and calculate intervals across zero
- Solve number problems and practical problems that involve all of the above.

Number - addition, subtraction, multiplication and division

- Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to 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 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
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

Number - fractions (including decimals and percentages)

- Use common factors to simplify fractions; use common multiples to express fractions in the same denomination
- Compare and order fractions, including fractions >1
- Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
- Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, ¼ × ½ = ⅛]
- Divide proper fractions by whole numbers [for example, ⅓ ÷ 2 = ⅙]
- Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, ⅜]
- I dentify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places
- Multiply one-digit numbers with up to two decimal places by whole numbers
- Use written division methods in cases where the answer has up to two decimal places.
- Solve problems which require answers to be rounded to specified degrees of accuracy
- Recall and use equivalences between simple fractions, decimals and percentages including in different contexts.

Ratio and Proportion

- Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts
- Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and use percentages for comparison
- Solve problems involving similar shapes where the scale factor is known or can be found
- Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples

Algebra

- Use simple formulae
- Generate and describe linear number sequences
- Express missing number problems algebraically
- Find pairs of numbers that satisfy number sentences involving two unknowns
- Enumerate possibilities of combinations of two variables

Measurement

- Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places 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 notation to up to three decimal places
- Convert between miles and kilometres
- Recognise that shapes with the same areas can have different perimeters and vice versa
- Recognise when it is possible to use the formulae for area and volume of shapes
- Calculate the area of parallelograms and triangles
- Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm3) and cubic metres (m3), and extending to other units [for example, mm3 and km3]

Geometry - properties of shapes

- Draw 2-D shapes using given dimensions and angles
- Recognise, describe and build simple 3-D shapes including making nets

- Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
- Illustrate and name parts of circle, including radius, diameter and circumference and know that the diameter is twice the radius
- Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

Geometry - position and direction

- Describe positions on the full coordinate grid (all four quadrants)
- Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.

Statistics

- Interpret and construct pie charts and line graphs and use these to solve problems
- Calculate and interpret the mean as an average

How we plan learning in Mathematics

Each class teacher plans maths using a small steps approach which breaks the learning journey into smaller chunks that build on each other. Within the mixed age-classes, these small steps take account of the skills and knowledge needed in each year group (through the use of a 'cold task'). The planning process takes into account the models and images that will be used to support the concept, the language that will be used as well as variation within the guided and independent work that the children will undertake. These steps will be shown on working walls in the classroom. **(See Appendix 1)**

The following points demonstrate how this approach to planning might look in a lesson:

Whole class together
We teach Mathematics to whole classes whilst being careful not to make assumptions of learners by grouping them by 'ability'. At the planning stage, teachers consider modifications or adaptations which may be required should learners struggle to grasp concepts and, for those who grasp concepts quickly within a lesson, the teachers plan greater depth tasks to challenge and deepen the learners' understanding further rather than simply accelerating to new content. Split inputs will be used where appropriate to cater for the needs of different learners and different year groups.

Longer but deeper
We use various materials to support this approach to the teaching and learning of Mathematics. Each lesson develops the concept from the previous one in logically sequenced phases. Progress and understanding are enhanced as children have a deeper understanding of the concepts being taught which act as secure building blocks for future learning.

Use of language
The use of appropriate vocabulary and the use of 'stem sentences' to support learning are identified during planning and a clear journey through the maths should be shown in classrooms on the working walls. Responses are expected in full sentences, using precise mathematical vocabulary.

Fluency
We recognise that 'fluency' is not just about remembering facts and we develop all aspects of fluency through lessons as well as providing opportunities to practise skills such as addition and subtraction facts (KS1) and times tables (KS2).

How we assess learning in Mathematics

Our assessment procedures recognise that the aims of the curriculum cannot be assessed through coverage (ticking many objectives off a list) but through depth within a topic.

Marking

The marking policy for Mathematics acknowledges the different style of teaching in maths, and takes its cue from the NCETM guidelines published in April 2016. The policy requires that learning is ticked and a comment is only made if/when a teacher feels this is necessary to move learning forward. Usually, gaps are addressed through same day catch-up and focused work will be recorded in books. The most valuable feedback is given directly during a lesson. Teachers use the daily planning and feedback sheets to identify pupils' next steps, whether some pupils may need pre-teaching or a feedback task before the next session.

Flexible grouping

We do not group or set learners by ability. Our priority is to meet learners' needs within the lesson (rather than after) through timely intervention in the form of 'cutaway' groups. However, sometimes learners may be reorganised into groups in response to an assessment of the outcomes of a lesson where it is clear that they would benefit from further focused intervention or to meet to needs identified by different year groups learning in the same class.

SEND provision

We involve SEND learners as much as possible in the whole class journey. However, we recognise that this is not always appropriate and, where they require a different or divergent journey and resources, this is also planned within the main theme of learning. Often, they will also complete additional activities outside of the Mathematics lesson, including through pre-learning opportunities.

Home learning

Teachers do not set specific homework for Mathematics in Key Stage 1. It is more valuable for parents/carers to support their child in developing key skills, such as adding and subtracting 1 digit numbers fluently, counting in 2s, 5s and 10s and learning double and halves.

Children in key stage two have a Times Table Rock Stars login. Times Tables Rock Stars is a carefully sequenced online programme of regular times tables practice. Each week concentrates on a different times table, with a consolidation week for rehearsing the tables that have recently been practised every third week or so. Children are encouraged to use this at school and at home to practise their timetables.

A sample section from a typical weekly maths plan (Years 1 and 2)

	Focus question on the board - what coins can we exchange for £1	Find different combinations of coins that equal the same amount of money Know that 100p = £1 Know 100p = 2 x 50p = 10 x 10p = 5 x 20p £1 and relate tables facts to money facts	**Success Criteria:** Year 1 and 2 Success Criteria: - All will be able to recognise and explain the value of different coins - Most will be able to work out how each coin can be exchanged for different coins - Some will be able to solve word problems involving exchanging different coins **Task:** In focus - Emma wants to exchange £1 for small change. What coins can she get for £1? Let's learn - 1 one-pound coin = 10 ten-pence coins. Emma can exchange £1 for 10 ten pence coins. What is the greatest number of coins she can get for £1? What is the fewest number of coins she can get for £1? Hannah wants to exchange £2. 1 two-pound coin = 2 one-pound coins. She can exchange £2 for 2 one-pound coins. We can also exchange other coins - children have pretend money to exchange other coins. Guided practise - children to use whiteboards and show the same value as each of the following: 20p, £1. Children complete a task sheet, drawing the different coins that can be exchanged in their books. Coins that can be exchanged: 1 two-pence coin = 2 one-pence coins 1 five-pence coin = 5 one-pence coins 1 ten-pence coin = 2 five-pence coins 1 twenty-pence coin = 2 ten-pence coins 1 fifty pence coin = 5 ten-pence coins Whole Class together.
Mon day			