Frimley Church of England School

Maths - Skills and Knowledge Progression

Intent

At Frimley, we believe that enjoyment is paramount to our aim of developing confident mathematicians. Through a rich and engaging mathematical curriculum, pupils will have opportunities to develop and apply their fluency, reasoning and problem-solving skills to support their attainment so that they are ready for further progress at the next stage of their educational development.

We aim to ensure that mathematics is exciting, engaging, challenging and provides all learners with the chance to achieve successes in every lesson so to foster a positive attitude and growth-mindset towards the subject. Fluency, reasoning and problem-solving are the focal points of learning; this along with a small-step approach with a focus on mastery ensures that children develop and secure their understanding of mathematical concepts. Often, learning is investigative, encouraging children to deepen their learning by following their own lines of enquiry.

Implementation

Through careful planning, use of a small-step approach and pre-teaching of processes and mathematical vocabulary, where appropriate, all learners are able to access each lesson. Assessment of learning, both during and after lessons, ensures that learners can be supported fluidly or extended appropriately thus providing all with the opportunity to deepen their learning in every lesson. In lessons, teachers provide pupils with appropriate models and scaffolds whilst resources are utilised, where appropriate, so that pupils can secure concrete and pictorial understanding of concepts or processes before applying their understanding to a range of abstract representations.

Pupils are provided with retrieval challenges in all lessons to support retention and long-term memory of previously taught areas. Wherever possible, pupils are given opportunities to practise their fluency, reasoning and problem-solving skills in each lesson. Through full coverage of the National Curriculum, links to prior learning and real-life situations are explicitly made so that pupils are building on previous experiences whist also recognising the links that can be made across the curriculum and beyond. In lessons, resources from White Rose Hub are used to support the small-step approach; a range of other resources such as Nrich, Teach Active and online platforms TTrockstars and Numbots are also regularly used to ensure that teaching is active, relevant and engaging.

Monitoring of maths provision will be an ongoing process throughout the academic year. Maths leaders will monitor lesson flipcharts (including teacher models and inputs, learning scaffolds, resources used and learning activities) and learning outcomes through scrutiny of work and pupil and staff voice – both formally and informally. Assessment outcomes will also be monitored and analysed to identify wider school trends. Subsequent actions will be taken in response to all formats of monitoring to continually improve maths provision.

Possessing a range of mental maths strategies supports learning and progress in the 3 key areas of maths: fluency, reasoning and problem-solving. Regular mental maths lessons (short and focused) support pupils' development in this area. TTrockstars and Numbots are two of the online resources used to help inspire pupils in this area of learning. A mental maths progression plan is in place throughout the school with regular monitoring to inform individual pupils' areas of development and to inform teaching focus.

Weekly MyMaths and TTrockstars tasks are set to provide pupils with the chance to consolidate the learning they have done in school, although this is optional for all year groups. Rock star of the month will be selected for each year group and announced in assembly with their photos being displayed on the maths board in the hall.

Throughout the academic year, pupils will have opportunities to attend maths competitions and the maths leaders will continue to explore and utilise opportunities to raise the profile of maths across the school.

Impact

- Pupils will enjoy maths, approaching the subject with a positive attitude and growth-mindset.
- All pupils will be able to access learning and appropriate challenge for all will be provided in all lessons.
- The percentage of pupils achieving age related expectations or higher by the end of the academic year will increase thus ensuring they are ready for further progress in the next stage of their educational development.
- Pupils will have a deep understanding of the methodology in maths and be able to explain their understanding. This will develop their reasoning and problem-solving skills.
- Pupils will possess a wide range of mental strategies and will understand the importance of times tables and number bonds with the majority being able to recall all times tables by the end of Year 4.
- Mental methods will be embedded and be independently applied to solve challenging problems.
- Pupils will be able to make mathematical links to other areas of the curriculum and wider life.
- Pupils will be actively engaged in representing the school in mathematical competitions.

National curriculum expectations:

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject. By the end of key stage 2, pupils are expected to know, apply and understand the matters, skills and processes as specified in the document below.

Pupils should be taught:

- To become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- To reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- To solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

What Frimley offers to its pupils:

	Year 3	Year 4	Year 5	Year 6
Core Knowledge	• Number and place value • Addition and subtraction Multiplication and division • Fractions • Measurement • Geometry – properties of shape • Statistics	• Number and place value • Addition and subtraction Multiplication and division • Fractions (including decimals) Measurement • Geometry – properties of shape Geometry – position and direction Statistics	• Number and place value • Addition and subtraction Multiplication and division • Fractions (including decimals and percentages) • Measurement • Geometry – properties of shape • Geometry – position and direction	• Number and place value • Addition and subtraction Multiplication and division • Fractions (including decimals and percentages) • Measurement • Geometry – properties of shape • Geometry – position and direction
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** • 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 problems	• Numbers up to **4 digits** • **Introduction to decimals** • Find **1000** more or less than a given number. **Count backwards through and past zero** • Round to the nearest 10, 100 or 1000 & solve problems • **Roman numerals to 100**	• Numbers **up to 1,000,000** • **Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000** • **Problems involving negative numbers** • **Round to the nearest 10 000 and 100 000** • Roman numerals to **1000 and recognise years** • **Prime numbers, prime factors and composite**	• **Numbers up to 10 000 000**
Addition and subtraction	• Add and subtract numbers mentally, including: - a three-digit number and ones - a three-digit number and tens.	• Add and subtract numbers with **up to 4 digits**	• Add and subtract whole numbers with **more than 4 digits (and mentally)**	• **BIDMAS**

	- a three-digit number and hundreds • **Columnar addition and subtraction – up to 3 digits** • **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	• **2 step +/- problems deciding which operations & methods to use/ why**		
Multiplication and Division	• Recall and use multiplication and division facts for the **3, 4 and 8** multiplication tables. • **Use x, ÷ and = to write statements** • **Multiplication of two-digit numbers times one-digit numbers**, using mental and progressing to **formal written methods.** • **Recognise odd and even numbers** • Solve problems, including missing number problems, involving **multiplication and division.**	• **Count in multiples of 6,7,9,25,1000** • **Find the effect of dividing a one- or two-digit number by 10 and 100** • **Multiplication and division facts up to 12 × 12** • **Multiplying together three numbers** • **Factor pairs** • **Multiply 3-digit numbers by a 1-digit** • **Harder correspondence problems such as n objects are connected to m objects**	• Multiply numbers **up to 4 digits by a** one- **or two digit** • Divide numbers **up to 4 digits by a one-digit number** • Multiply and **divide decimal numbers** by 10, 100 and 1000 • **Squared and cubed numbers** • **Common factors of two numbers** • **Multi-step problems**	• **Multiply one-digit numbers with up to two decimal places by whole numbers** • **Multiply multi-digit numbers up to 4 digits (long multiplication)** • **Short and long division 4 divided by 2 digits (with decimals) Interpret remainders to context** • **Use estimation to check answers to calculations** • **BIDMAS**
Fractions, Decimals and Percentages	• Count up and down in tenths; • Recognise, find and write **and use** fractions of a discrete set of objects: 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 <1** • **Compare and order unit fractions, and fractions with the same denominators.** • **Solve problems that involve all of the above.**	• **Common equivalent fractions** • **Count up and down in hundredths** • **Recognise and write decimal equivalents of any number of tenths or hundredths** • **Recognise and write decimal equivalents to 1/4, 1/2 and 3/4** • **Solve simple measure and money problems involving fractions and decimals to two decimal places** • **Round decimals with 1dp to the nearest whole number**	• **Scaling by simple fractions and problems involving simple rates** • **Compare, order, add and subtract fractions with the same multiple denominators** • **Convert mixed numbers and improper fractions** • **Multiply proper fractions and mixed numbers by whole numbers** • **Equivalences between tenths, hundredths and thousandths** • **Read, write, order and compare 3dp** • **Decimal/ percentage equivalences**	• **Fraction, decimal and percentage equivalences** • **Use common factors to simplify fractions** • **Compare and order fractions > 1** • **Add and mixed numbers** • **Multiply simple pairs of proper fractions** • **Divide proper fractions by whole numbers**
Measurement	• Measure, compare**, add and subtract metric measures.**	• **Convert between different units of measure**	• **Metric and imperial units** • **Calculate and compare the area of rectangles**	• **Convert between miles and kilometres**

	• **Measure the perimeter of simple 2-D shapes.** • **Add and subtract amounts of money to give change, using both £ and p** • Tell and write the time from an **analogue clock with accuracy of minutes** including using **Roman numerals from I to XII**, and **12-hour and 24-hour clocks** • **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**	• Measure and calculate the perimeter of a **rectilinear figure** • **Compare and calculate different measures, including money**	• **Volume** • **Converting** between units of **time** • **Use all four operations using decimal notation**	• **Same areas can have different perimeters and vice versa** • **Formulae for area and volume of shapes** • **Area of parallelograms and triangles**
Geometry	• 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 and discuss rotation in terms of '1/4 turns' etc**. • **Identify whether angles are greater than or less than a right angle.** • Identify horizontal and vertical lines and **pairs of perpendicular and parallel lines.**	• **Geometry – position and direction** • **Plot points and draw sides to complete a given polygon** • **Describe positions on a 2- D grid** • **Translations** • **Complete a simple symmetric figure with respect to a specific line of symmetry**	• **Estimate and compare angles in degrees** • **Draw and measure angles in degrees** • **Use the properties of rectangles to deduce related facts** • **Distinguish between regular and irregular polygons based on reasoning**	• **Make nets** • **Calculate angles in any triangles, quadrilaterals, and regular polygons (and missing angles)** • **Illustrate and name parts of circles**
Statistics	• Interpret and present data using **bar charts**, pictograms and tables • Solve one-step **and two step questions** using information presented in scaled bar charts and pictograms and tables.		• **Introducing a line graph** • Complete, read and interpret information on **timetables**	• **Interpret and construct pie charts** • **Calculate and interpret the mean**
Ratio & proportion				• **Ratio and proportion**
Algebra				• **Algebra**
Skills	- Collaboration	- Collaboration	- Collaboration	- Collaboration

	- Problem solving - Reasoning - Comparing - **Applying** - Handling money and calculating change - Calculating with the four operations - Telling the time - Reading tables and charts - Represent data visually - Make comparison between equivalences - Accuracy with measure - Estimating	- Problem solving - Reasoning - Comparing - Applying - Handling money - Calculating with the four operations - Telling the time - Reading tables and charts - Represent data visually - Make comparison between equivalences - Accuracy with measure - Estimating	- Problem solving - **Analysing** - Reasoning - **Interpreting** - Comparing - **Calculations with money – life skills** - Calculating with the four operations - **Solving problems with time** - Reading **timetables**, tables and charts - Represent data visually - Make comparison between equivalences - Accuracy with measure - Estimating	- Problem solving - Analysing - Reasoning - Interpreting - Comparing - Calculating with the four operations - **Calculating sales (%)** - Reading timetables, tables and charts - Represent data visually - Make comparison between equivalences - Accuracy with measure - Estimating