Mathematics Policy 2020-2021

School Aims

We aim to ensure that every child leaves St Paul's Primary School & Nursery with the best mathematical skills and knowledge, so that every child can achieve to the best of their ability. Their high-quality mathematics education will provide them with a foundation for understanding the world, the ability to reason mathematically and a sense of enjoyment and curiosity about the subject.

The National Curriculum for mathematics aims to ensure that all pupils:
*become **fluent** in the fundamentals of mathematics, including 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.
***reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
*can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

Intent

Within our school, the National Curriculum aims are embedded within mathematical sessions and consistently developed overtime. We are committed to ensuring that all children are able to recognise the importance of mathematics in the wider world. The children can then use their mathematical skills confidently in their lives in a range of contexts. We want all children to be at enthused and engaged within the subject, so that they can experience success with the ability to calculate fluently, reason and problem solve. We aim to develop children's curiosity of mathematics and appreciate its beauty and power in our society.

Implementation

To ensure whole school consistency and progression of the school uses the DFE approved White Rose mathematics scheme. The children have many opportunities to develop their fluency of skills, their reasoning of mathematics and their problem-solving skills over individual key concepts of learning. New concepts are shared and modelled with fluency reasoning and problem solving, over a sequence of key lessons, interlinking real-life contexts that link to other areas of learning, where possible. In Key Stage One, these new concepts are always presented with objects (concrete manipulatives) for the children to use. Children can also use a range of concrete

manipulatives within Key Stage two, when needed. Once concrete concepts are developed the children can move into exploring pictorially and then abstractly. Teachers use a range of questioning skills to draw children's discussions and their reasoning. Once fluency is developed the class teacher then teaches the children the strategies for reasoning and solving problems. Independent work provides the means for all children to develop their fluency further before progressing to more complex related problems. Mathematical topics are talking blocks to enable the achievement of mastery over time. Each sequence of lessons a 'lesson phase' provides the means to achieve greater depth with more able children offered sophisticated problems as well as exploratory, investigative tasks within the lesson as appropriate.

Impact

The impact of our Mathematics curriculum is that the children understand the relevance of what they are learning and what learning came before this. Mathematics books are completed within each year groups showing the developed progression evidence of fluency, reasoning and problem solving. The children become fluent, successful reasoners with the ability to problem solve within a wider context. The children will become creative, fluent problem solvers who will face challenges with resilience.

Organisation

In order to achieve the above aims, teachers devise medium-term plans drawing upon the National Curriculum and Early Years Foundation Stage materials.

EYFS

Mathematics is one of the four specific areas within the **Early Years Foundation Stage** (EYFS). Each specific area is divided into Early Learning Goals, for maths these are:

- Numbers - children learn to count and the value of numbers, higher and lower. These skills support them to solve problems, use money and calculate more or less.
- Shape, Space and Measure - these skills support children to understand size, weight, capacity, position, distance, time and money and compare quantities, objects and solve problems

The Mathematics curriculum follows the mathematical development the Early Years Foundation Stage.
At this age, children are provided with opportunities to develop and improve their skills in counting, understanding and using numbers, calculating simple addition and subtraction problems; and to describe shapes, spaces, and measures. They are given opportunities to explore numbers, measures, patterns, shapes and space through a variety of practical activities, using both the indoor and outdoor classrooms. They are encouraged to talk about and enjoy all aspects of mathematics. Where possible the children will use concrete resources to aid their understanding within concepts and develop their understanding of pictorials. White Rose Mathematics will

be used where appropriate.

KS1 and KS2

The Mathematics curriculum is based upon White Rose Mathematics. All teachers will plan out their Medium Term and Short Term plan using the guidance given by the White Rose Mathematics. These guidance documents aim to develop a deep understanding within all concepts of mathematics, confidence and competence within mathematics that produces strong secure learning for the children. The children will become independent, reflective thinkers, whose skills will support them across the rest of the curriculum. The children will develop their understanding through a cycle of concrete, pictorial and abstract learning, which will enable them to have a deep understanding.
Each daily mathematics lesson will incorporate a Five A Day learning starter as well as the teaching and practice of mathematical skills.

Inclusion

At our school, we teach mathematics to all children, whatever their ability. Mathematics forms part of the school curriculum policy to provide a broad and balanced curriculum to all children. Through our mathematics teaching we provide learning opportunities that enable all pupils to make progress. We do this by ensuring the activities are differentiated but challenging for each child's needs. Marking and assessments help us to consider each child's attainment and progress and to plan future lessons appropriately.

Equal Opportunities

The school is committed to ensuring the active participation and progress of all children in their learning. All children will be given equal opportunities to achieve their best possible standard, whatever their current attainment and irrespective of gender, ethnic, social or cultural background, home language or any other aspect that could affect their participation or the progress of which they are capable.

Assessment

At the end of 'phase' planning concepts there will be an assessment to identify how secure the children are with the key knowledge within those concepts. There will also be an end of block assessment at the end of a term of learning to see the children's developments within these areas. This information will be collated and shared with the Math's Lead and SLT to identify any intervention/ Pre-learning that needs to take place. Key Assessment data will be recorded on the school's tracker system 'Insight' reflecting the children's security within the learning objectives.

Calculation Policy

Our schools 'Calculation Policy' outlines the methods we within our school to calculate fluently, show clear reasoning and the methods used to solve mathematical problems. Within school we follow a Concrete, Pictorial, Abstract (CPA) approach, which links clearly with White Rose Maths, which in turn meets the needs of the National Curriculum. We have concrete manipulatives available throughout our Mathematics lessons, so that the children can learn skills in a concrete form first. Manipulatives include the use of cups and counter for part, part, whole, tens frames, bead strings, counters, cubes, dice, base 10, 100-squares and number lines. However, It is important that the children can develop their abstract levels of learning, so that they can solve problems and reason their answers without relying on these resources.

Homework

Homework is fortnightly for Mathematics throughout the school following the homework policy and within the system and structures booklet. This homework will aim to embed the children's learning concepts from that week, so that they can complete it independently.

Cross-Curriculum

As well as teaching specific mathematics skills, the children need to understand how these relate to real life situations to make them meaningful. We offer opportunities for the children to use their mathematical skills in different contexts across the primary curriculum. We also aim to teach children about the importance of economic well-being, through a variety of different tasks and activities.

Role of the teacher

The class teacher is responsible for planning and delivering the Mathematics curriculum for the children within their class, liaising with the Mathematics lead when necessary. Teachers will ensure progression in the acquisition of mathematical skills with due regard to the National Curriculum for Mathematics and our school's calculation policy. They will liaise with colleagues within the school and colleagues in secondary education to ensure the provision is appropriate.

Teachers will continue to develop and update their skills, knowledge and understanding of mathematics through appropriate CPD training. Throughout each year, it is the class teachers' responsibility to inform parents of pupils' progress, achievements and attainments in mathematics either through verbal feedback within parental meetings and within the form of a written report at the end of the year. It is also the teacher's responsibility to carry out pupil assessments and keep record of their progress.

Leadership and Management – Role of the Subject Leader

The subject leader will raise the profile of Maths St Paul's Community Primary School through best practice. The Maths Lead and SLT will model lessons, as appropriate to new staff, NQTs and peers to support continued professional development. They will ensure the high quality of Maths displays around the school, present certificates of achievement during end of term assemblies and involve the school in 'celebrations' of Maths like cross classroom challenges. The subject leader will support staff in providing opportunities for learning outside the classroom within Maths and will identify and organise opportunities which enable this, as appropriate.

The subject leader will monitor progression and continuity of Maths throughout the school through lesson observations and regular monitoring of outcomes of work in Maths exercise books and Pupil Survey.

The subject leader will ensure that all staff have access to year group plans and the relevant resources, which accompany them.

The subject leader will monitor children's progress through the analysis of whole school data. They will use this data to inform the subject development plan, which will detail how standards in the subject are to be maintained and developed further.

Through involvement in the DfE funded Maths Hubs programme starting September 2020, the subject leader will keep up to date on current developments in Maths education and disseminate information to colleagues. They will also contribute directly to the Maths Hubs programme and trail and model best practices as a result.

Progression following the DFE guidance July 2020

Progression of Y1 – Y6. Children need to be secure within the objective within their year group to gain their skills across the subject.

Number and place value	**NPV**
Number facts	**NF**
Addition and subtraction	**AS**
Multiplication and division	**MD**
Fractions	**F**
Geometry	**G**

Strand	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
NPV	1NPV–1 Count within 100, forwards and backwards, starting with any number.		3NPV–1 Know that 10 tens are equivalent to 1 hundred, and that 100 is 10 times the size of 10; apply this to identify and work out how many 10s there are in other three-digit multiples of 10. →	4NPV–1 Know that 10 hundreds are equivalent to 1 thousand, and that 1,000 is 10 times the size of 100; apply this to identify and work out how many 100s there are in other four-digit multiples of 100. →	5NPV–1 Know that 10 tenths are equivalent to 1 one, and that 1 is 10 times the size of 0.1. Know that 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01. Know that 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01. →	6NPV–1 Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100, 1,000, 1 tenth, 1 hundredth or 1 thousandth times the size (multiply and divide by 10, 100 and 1,000).
		2NPV–1 Recognise the place value of each digit in two-digit numbers, and compose and decompose two-digit numbers using standard and non-standard partitioning. →	3NPV–2 Recognise the place value of each digit in *three*-digit numbers, and compose and decompose *three*-digit numbers using standard and non-standard partitioning. →	4NPV–2 Recognise the place value of each digit in *four*-digit numbers, and compose and decompose *four*-digit numbers using standard and non-standard partitioning. →	5NPV–2 Recognise the place value of each digit in numbers with up to 2 decimal places, and compose and decompose numbers with up to 2 decimal places using standard and non-standard partitioning. →	6NPV–2 Recognise the place value of each digit in numbers up to 10 million, including decimal fractions, and compose and decompose numbers up to 10 million using standard and non-standard partitioning.
	1NPV–2 Reason about the location of numbers to 20 within the linear number system, including comparing using < > and = →	2NPV–2 Reason about the location of any two-digit number in the linear number system, including identifying the previous and next multiple of 10. →	3NPV–3 Reason about the location of any *three*-digit number in the linear number system, including identifying the previous and next multiple of 100 and 10. →	4NPV–3 Reason about the location of any *four*-digit number in the linear number system, including identifying the previous and next multiple of 1,000 and 100, and rounding to the nearest of each. →	5NPV–3 Reason about the location of any number with up to 2 decimals places in the linear number system, including identifying the previous and next multiple of 1 and 0.1 and rounding to the nearest of each. →	6NPV–3 Reason about the location of any number up to 10 million, including decimal fractions, in the linear number system, and round numbers, as appropriate, including in contexts.

Strand	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
NPV			3NPV–4 Divide 100 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 100 with 2, 4, 5 and 10 equal parts. →	4NPV–4 Divide 1,000 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 1,000 with 2, 4, 5 and 10 equal parts. →	5NPV–4 Divide 1 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in units of 1 with 2, 4, 5 and 10 equal parts. →	6NPV–4 Divide powers of 10, from 1 hundredth to 10 million, into 2, 4, 5 and 10 equal parts, and read scales/number lines with labelled intervals divided into 2, 4, 5 and 10 equal parts.
					5NPV–5 Convert between units of measure, including using common decimals and fractions.	
NF	1NF–1 Develop fluency in addition and subtraction facts within 10. →	2NF–1 Secure fluency in addition and subtraction facts within 10, through continued practice. →	3NF–1 Secure fluency in addition and subtraction facts that bridge 10, through continued practice.			
	1NF–2 Count forwards and backwards in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count forwards and backwards through the odd numbers. →		3NF–2 Recall multiplication facts, and corresponding division facts, in the 10, 5, 2, 4 and 8 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number. →	4NF–1 Recall multiplication and division facts up to 12×12, and recognise products in multiplication tables as multiples of the corresponding number. →	5NF–1 Secure fluency in multiplication table facts, and corresponding division facts, through continued practice.	
				4NF–2 Solve division problems, with two-digit dividends and one-digit divisors, that involve remainders, and interpret remainders appropriately according to the context.		
			3NF–3 Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 10). →	4NF–3 Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 100) →	5NF–2 Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 1 tenth or 1 hundredth).	

Strand	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
AS	1AS–1 Compose numbers to 10 from 2 parts, and partition numbers to 10 into parts, including recognising odd and even numbers.	2AS–1 Add and subtract across 10.	3AS–1 Calculate complements to 100.			6AS/MD–1 Understand that 2 numbers can be related additively or multiplicatively, and quantify additive and multiplicative relationships (multiplicative relationships restricted to multiplication by a whole number).
	1AS–2 Read, write and interpret equations containing addition (+), subtraction (−) and equals (=) symbols, and relate additive expressions and equations to real-life contexts.	2AS–2 Recognise the subtraction structure of 'difference' and answer questions of the form, "How many more…?".	3AS–2 Add and subtract up to three-digit numbers using columnar methods.			6AS/MD–2 Use a given additive or multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding.
		2AS–3 Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract only ones or only tens to/from a two-digit number.	3AS–3 Manipulate the additive relationship: Understand the inverse relationship between addition and subtraction, and how both relate to the part–part–whole structure. Understand and use the commutative property of addition, and understand the related property for subtraction.			6AS/MD–3 Solve problems involving ratio relationships.
		2AS–4 Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract any 2 two-digit numbers.				6AS/MD–4 Solve problems with 2 unknowns.

Strand	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
MD		2MD–1 Recognise repeated addition contexts, representing them with multiplication equations and calculating the product, within the 2, 5 and 10 multiplication tables.	3MD–1 Apply known multiplication and division facts to solve contextual problems with different structures, including quotitive and partitive division.	4MD–1 Multiply and divide whole numbers by 10 and 100 (keeping to whole number quotients); understand this as equivalent to making a number 10 or 100 times the size. →	5MD–1 Multiply and divide numbers by 10 and 100; understand this as equivalent to making a number 10 or 100 times the size, or 1 tenth or 1 hundredth times the size.	For year 6, MD ready-to-progress criteria are combined with AS ready-to-progress criteria (please see above).
		2MD–2 Relate grouping problems where the number of groups is unknown to multiplication equations with a missing factor, and to division equations (quotitive division).		4MD–2 Manipulate multiplication and division equations, and understand and apply the commutative property of multiplication.	5MD–2 Find factors and multiples of positive whole numbers, including common factors and common multiples, and express a given number as a product of 2 or 3 factors.	
				4MD–3 Understand and apply the distributive property of multiplication. →	5MD–3 Multiply any whole number with up to 4 digits by any one-digit number using a formal written method.	
					5MD–4 Divide a number with up to 4 digits by a one-digit number using a formal written method, and interpret remainders appropriately for the context.	

Strand	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
F			3F–1 Interpret and write proper fractions to represent 1 or several parts of a whole that is divided into equal parts.			6F–1 Recognise when fractions can be simplified, and use common factors to simplify fractions.
			3F–2 Find unit fractions of quantities using known division facts (multiplication tables fluency). →		5F–1 Find non-unit fractions of quantities.	6F–2 Express fractions in a common denomination and use this to compare fractions that are similar in value.
			3F–3 Reason about the location of any fraction within 1 in the linear number system. →	4F–1 Reason about the location of mixed numbers in the linear number system.		6F–3 Compare fractions with different denominators, including fractions greater than 1, using reasoning, and choose between reasoning and common denomination as a comparison strategy.
				4F–2 Convert mixed numbers to improper fractions and vice versa.	5F–2 Find equivalent fractions and understand that they have the same value and the same position in the linear number system.	
			3F–4 Add and subtract fractions with the same denominator, within 1. →	4F–3 Add and subtract improper and mixed fractions with the same denominator, including bridging whole numbers.	5F–3 Recall decimal fraction equivalents for $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$ and $\frac{1}{10}$, and for multiples of these proper fractions.	
G	1G–1 Recognise common 2D and 3D shapes presented in different orientations, and know that rectangles, triangles, cuboids and pyramids are not always similar to one another. →	2G–1 Use precise language to describe the properties of 2D and 3D shapes, and compare shapes by reasoning about similarities and differences in properties. →	3G–1 Recognise right angles as a property of shape or a description of a turn, and identify right angles in 2D shapes presented in different orientations.		5G–1 Compare angles, estimate and measure angles in degrees (°) and draw angles of a given size.	

Strand	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
G					5G–2 Compare areas and calculate the area of rectangles (including squares) using standard units.	
	1G–2 Compose 2D and 3D shapes from smaller shapes to match an example, including manipulating shapes to place them in particular orientations. →		3G–2 Draw polygons by joining marked points, and identify parallel and perpendicular sides. →	4G–1 Draw polygons, specified by coordinates in the first quadrant, and translate within the first quadrant. →		6G–1 Draw, compose, and decompose shapes according to given properties, including dimensions, angles and area, and solve related problems.
				4G–2 Identify regular polygons, including equilateral triangles and squares, as those in which the side-lengths are equal and the angles are equal. Find the perimeter of regular and irregular polygons.		
				4G–3 Identify line symmetry in 2D shapes presented in different orientations. Reflect shapes in a line of symmetry and complete a symmetric figure or pattern with respect to a specified line of symmetry.		

Factual fluency progression

	Year 1	Year 2	Year 3	Year 4	Year 5
Additive factual fluency	Addition and subtraction within 10.	Addition and subtraction across 10.	Secure and maintain fluency in addition and subtraction within and across 10, through continued practice.		
Multiplicative factual fluency			Recall the 10 and 5 multiplication tables, and corresponding division facts.	Recall the 3, 6 and 9 multiplication tables, and corresponding division facts.	Secure and maintain fluency in all multiplication tables, and corresponding division facts, through continued practice.
			Recall the 2, 4 and 8 multiplication tables, and corresponding division facts.	Recall the 7 multiplication table, and corresponding division facts.	
				Recall the 11 and 12 multiplication tables, and corresponding division facts.	