Maths Policy 2020

These days it is common to hear people say they are, 'no good at maths' or state that they, 'can't do maths!" At Poplar Farm we aim to foster a 'can do' attitude towards Maths. If we feel we can't do it, the sentence is always followed with YET! "I can't do it yet!"

Intent statement

At Poplar farm school we aim to teach children how to make sense of the world around them by developing their ability to calculate, reason and solve problems. We aim to support children in achieving economic well-being by equipping them with a range of computational skills and the ability to solve problems in a variety of contexts by delivering a mastery curriculum.

Our aims in the teaching of mathematics are:
• To promote enjoyment of learning through practical activity, exploration and discussion.
• To develop confidence and competence with numbers and the number system.
• To develop the ability to solve problems through decision-making and reasoning in a range of contexts.
• To develop a practical understanding of the ways in which information is gathered and presented; to explore features of shape and space, and developing measuring skills in a range of contexts.
• To help children understand the importance of mathematics in everyday life.
• 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.

The Importance of Mathematics

'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.'

(National Curriculum, 2014)

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AIMS

The 2014 national curriculum for mathematics aims to ensure that all pupils:

- Become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems.
- **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.

The National Curriculum for Mathematics

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The 2014 National Curriculum programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

Cross curricular

Mathematics teaches children how to make sense of the world around them through developing their ability to calculate, reason and solve problems. It is a core subject with a range of cross-curricular links but most often, is best taught discretely, using opportunities from other subjects to rehearse skills in a context.

Implementation

Our School Curriculum

In our school we will follow the White Rose Hub scheme of work to ensure we have full coverage of the 2014 National Curriculum. We will supplement our planning and resources using NCETM materials, Power Maths, Classroom Secrets, nRich and I See Reasoning to provide problem solving and

reasoning opportunities. In Key Stage 1, there will be daily math sessions that last approximately 1 hour. We will also provide extra sessions lasting 10 minutes at least 3 times a week to specifically develop number fluency and recall within the children's learning. The children will have the opportunity to use 'Number Bots' to practice numbers bonds as well quick recall of addition and subtraction facts. The guiding principle of this is to use it little and often. The children will have access to this during morning work and in their continuous provision. From Year 2 children will also use Times Tables Rock stars to develop their times tables recall. They will have access to both of these resources at school and at home via an app.

Each National Curriculum objective is broken down in to small steps in order for children to be able to successfully meet the objective. Children will have the opportunity during the lesson to move through a range of challenges so they are all able to access the curriculum and all have the opportunity to deepen their understanding of the objective.

Wherever possible, we provide meaningful contexts and encourage the children to apply their learning to everyday situations. Although mathematics is best taught discretely, it has many cross-curricular links. Teachers need to use opportunities in other subjects to rehearse skills in a context. Mathematics involves developing confidence and competence in number work, geometry, measures and statistics and the using and applying of these skills.

The curriculum is delivered by class teachers. Children are taught in class groups from Foundation Stage upwards. In all classes, children are taught in a variety of groupings (whole class, groups, pairs, one to one) relevant to the objective being taught. Where appropriate groups/individual children are supported by teaching assistants. In line with the new curriculum, the school is using a mastery approach to teaching which has been customised to meet the needs of our children. Staff are kept up to date on current thinking, new teaching methodologies and ideas by the subject leader through staff meetings and Inset. CPD will be available where possible for staff who need to improve their understanding of the requirements of the new national curriculum, new methodologies and assessment/testing arrangements.

All classrooms will have a display area specifically for mathematics. This is called a working wall and will display items that children need to support and develop the unit's learning. For example, key vocabulary, success criteria, models, key questions. In the Early Years' Foundation Stage there are also specific mathematical areas for children to access in their everyday learning.

Early Years Foundation Stage (EYFS)

EYFS Practitioners also use White Rose Hub to ensure coverage of the EYFS curriculum. They also use NCETM 'Number block' resources to support the teaching and learning in their classrooms. Teachers and practitioners support children in developing their understanding of mathematics in a broad range of contexts in which they can explore, enjoy, learn, practise and talk about their developing understanding. This area of development includes seeking patterns, making connections, recognising relationships, working with numbers, shapes and measures, and counting, sorting and matching. Children use their knowledge and skills in these areas to solve problems, generate new questions and make connections across other areas of learning and development.

Children in the EYFS learn by playing and exploring, being active, and through creative and critical thinking which takes place both indoors and outside. We recognise that children learn through routine, continuous provision and incidental learning opportunities, as well as planned sessions and activities. Mathematical understanding can be developed through stories, songs, games, routine, questioning, imaginative play, child-initiated learning and structured teaching.

Inclusion

Each child has an equal entitlement to all aspects of the Maths curriculum and to experience the full range of Maths activities. Therefore, in delivering Maths, care will be taken to ensure that all learning needs are met to ensure all children keep up with the learning and catch up needs are also met. Intervention groups will take place both within the Maths lesson and outside of it. These sessions may be delivered by the teacher or teaching assistant and may involve individual or small group work and may include extending the most able mathematicians as well as supporting learners who require additional practise of skills.

Assessment

At Poplar Farm we will assess mathematics by completing Maths questions based on 3 previously taught objectives each week. One question will be something that was recently taught. The second question will assess understanding of an objective from a previous term and the other will assess knowledge from the previous year on a topic that is about to be taught. The answers children give to these will inform planning for the future and assess their understanding. We will track their progress across the year by highlighting objectives that they consistently achieve from the national curriculum.

Other evidence will include photographs of their practical activities, work in exercise books, marking and notes on planning. Children are given feedback verbally and written in books in line with the marking policy.

Calculation Policy

Our 'Calculation Policy' outlines the methods we use at Poplar Farm to solve mathematical problems. We follow a CPA (Concrete, Pictorial, Abstract) approach. We have practical resources available throughout all of our Maths lessons. These resources include but are not limited to tens frames, bead strings, counters, cubes, dice, base 10, 100-squares and number lines. It is important to note that although the use of these concrete resources is essential for understanding, the aim is for children to be able to reason and solve problems without relying on these resources.

"The only way to learn mathematics is to do mathematics."
Paul R. Halmos, Hungarian-American mathematician

Spoken language

The national curriculum for mathematics reflects the importance of spoken language in pupils' development across the whole curriculum - cognitively, socially and linguistically. The quality and

variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. They must be assisted in making their thinking clear to themselves as well as others and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions. At Poplar Farm School, children are encouraged to justify, reason and provide proof through the use of logic prompts and open ended-questioning. Mathematical discussion is a requisite of every mathematics task both within defined mathematics lessons and through cross-curricular learning.

Parents

It is important that parents and carers are actively involved in the children's education. In order to help keep them informed of what is happening within school we run regular information sessions and learning cafés which explore current developments within the school, projects in which we are involved, new methodologies for delivering the Maths curriculum and also any statutory changes such as to the curriculum or assessment/testing arrangements. Parents are kept informed of topics that are being covered through a newsletter sent half-termly. During Parents' Evenings curricular targets are shared and a written report is completed annually in the Summer Term.

Leadership and Management

The subject leader's role is to empower colleagues to teach mathematics to a high standard and support staff in the following ways:

- By keeping up to date on current issues; disseminating relevant information and providing training for staff members (either directly or through other professionals)
- Leading by example by modelling lessons or styles of teaching
- Having a knowledge of the quality of mathematics provision across the school and using this to provide a coaching and mentoring role
- Identifying and acting on development needs of staff members
- Monitoring expectations, provision and attainment across the school and providing feedback to develop practice further in order to raise standards
- Providing necessary equipment and maintaining it to a high standard

Monitoring and Evaluation

The quality of teaching and learning is monitored as part of the appraisal process through lesson observations and through the progress and attainment documents. In addition, continuity and progression across the school is monitored by the mathematics subject leader as is the implementation and impact of Assessment for Learning. The mathematics action plan and external advisors identify actions intended to raise standards.

A named member of the governing body is briefed to oversee the teaching and learning of mathematics. The mathematics governor meets, at least termly, with the subject leader to review progress.

Progression of learning

The programmes of study in the new National Curriculum shows the progression in children's methods of calculation in the strands Number and place value; Addition and subtraction and Multiplication and division.

	Number and place value	Addition and subtraction	Multiplication and division
Year 1	Pupils should be taught to: • 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.	Pupils should be taught to: • 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.	Pupils should be taught to: • 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.

Year 2	Pupils should be taught to:
	• 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
		Pupils should be taught to:
		• solve problems with addition and subtraction:
		  o using concrete objects and pictorial representations, including those involving numbers, quantities and measures
		  o 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 100
			Pupils should be taught to:
			• 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

	• read and write numbers to at least 100 in numerals and in words
	• use place value and number facts to solve problems.
		• add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
		  o a two-digit number and ones
		  o a two-digit number and tens
		  o two two-digit numbers
		  o 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.
			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.

	Number and place value	Addition and subtraction	Multiplication and division

Year 3	Pupils should be taught to:
	• 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.
		Pupils should be taught to:
		• add and subtract numbers mentally, including:
		  o a three-digit number and ones
		  o a three-digit number and tens
		  o 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.
			Pupils should be taught to:
			• 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.

Year 4	Pupils should be taught to	Pupils should be taught to:	Pupils should be taught to:

	• 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.	• 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.	• 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.
	Number and place value	Addition and subtraction	Multiplication and division
Year 5	Pupils should be taught to: • 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	Pupils should be taught to: • add and subtract whole numbers with more than 4 digits, including using formal written methods (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	Pupils should be taught to: • identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers • Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers • establish whether a number up to 100 is prime and recall prime numbers up to 19

	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.	• solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.	• 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 1000 • 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 problems involving simple rates.
Year 6	Pupils should be taught to: • read, write, order and compare numbers up to 10 000 000 and determine the value of each digit	Pupils should be taught to: • 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	

	• round any whole number to a required degree of accuracy • use negative numbers in context, and calculate intervals across zero • solve number and practical problems that involve all of the above.	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

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