



POLICY FOR MATHEMATICS

Pickhurst Academy

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Document Purpose

This policy document sets out the school's aims, principles and strategies for the delivery of the Mathematics entitlement. It will form the basis for the development of Mathematics in the school over the next year. It gives guidance on planning, teaching and assessment. This policy is intended to be used in conjunction with the National Curriculum 2014, which gives details of what pupils in each age group, will cover.

Audience

This policy document, having been presented to and agreed upon by the whole staff, is distributed to all members of the teaching and non-teaching staff and the curriculum committee of the Governing Body. It will also be available on the school's shared drive system.

The significance of Mathematics

Mathematics is incredibly important in everyday life. It is integral to all aspects of life and with this in mind we endeavor to ensure that pupils develop a healthy and enthusiastic attitude towards mathematics that will stay with them. Most importantly, Mathematics equips pupils with the uniquely powerful set of tools to understand and change the world. These tools include reasoning, problem solving skills and the ability to think in abstract ways. Gradually widening pupils' experiences as they progress through school is an important step in providing rich and engaging learning across the curriculum. We plan carefully for pupils to have progressively richer experiences in every year.

At Pickhurst, pupils benefit from a flexible curriculum that builds on what they understand and know already. We believe that exposure, not only to culture but also to situations in which the pupils might not have previous experiences of, is of paramount importance to their ongoing successes.



Aims

At Pickhurst, we are committed to ensuring that all pupils achieve mastery in the key concepts of mathematics, in order that they make genuine progress and avoid gaps in their understanding that provide barriers to learning as they move through education.

Assessment for Learning, an emphasis on investigation, problem solving, the development of mathematical thinking, a deep understanding of mathematical concepts and development of teacher subject knowledge are essential components of our approach to this subject.

Each pupil is given opportunities to think and solve problems mathematically, with fluency, by using appropriate skills, reasoning, concepts and knowledge. They are provided with rich and enjoyable experiences related to their individual needs and to the wider requirements of society.

The 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 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.



We aim for each pupil to:

1. Have a positive attitude towards mathematics by developing pupils' confidence in using mathematical equipment and vocabulary, and through developing their mental strategies.
2. Have self-confidence in their ability to deal with mathematics.
3. Be able to work systematically, co-operatively and with perseverance.
4. Be able to think logically and independently.
5. Experience a sense of achievement regardless of age or ability.
6. Understand the appropriate underlying skills, concepts and knowledge of number, measurement, geometry, statistics, ratio and proportion, and algebra.
7. Encourage the use of mental calculations and formal written strategies to work out the answers.
8. Understand and appreciate pattern and relationship in mathematics.
9. Be able to communicate with peers and adults, ideas, experiences, questions, clearly and fluently, using the appropriate mathematical language.
10. Be able to explore problems using the appropriate strategies, predictions and deductions.
11. Be aware of the uses of mathematics beyond the classroom.
12. Be able to apply previously acquired concepts, skills, knowledge and understanding to new situations both in and out of school.

Our vision:

At Pickhurst, our vision is to:

- Promote a positive attitude towards mathematics in all pupils.
- To ensure all pupils are engaged in and are enjoying exploring Mathematics.
- To enable all pupils to find links between mathematics and other areas of the curriculum, including Science.
- To ensure all pupils progress in mathematics and are challenged appropriately through an in depth understanding.



- To use a wide range of concrete, pictorial and abstract representations to develop all pupils' relational understanding of mathematics.
- To ensure all pupils are confident using mathematical vocabulary when reasoning about mathematics.
- To promote a growth mind set in all pupils, particularly when Problem Solving.

Expectations

Our pupils should reach the Expected Standard by the end of Key Stage 2. This means they should:

- Have a sense of the size of number and where it fits into the number system.
- Know by heart number facts such as number bonds, multiplication tables, doubles and halves.
- Use what they know by heart to calculate mentally.
- Calculate accurately and efficiently, using mental and written methods, drawing upon the formal written methods for all operations.
- Make sense of number problems, including non- routine problems, and recognise the operations needed to solve them.
- Explain their methods and reasoning using correct mathematical vocabulary.
- Judge whether their answers are reasonable and have strategies for checking them where necessary.
- Suggest suitable units for measuring and making sensible estimates of measurements.
- Explain and make predictions from the numbers in graphs, diagrams, charts and tables.
- Develop spatial awareness and an understanding of the properties of 2D and 3D shapes.



Delivery

The pupils are taught in mixed ability classes and follow an integrated mathematics curriculum. In Year 6, the pupils are 'set' into ability groups based on teacher and Summative Assessments. Mathematics is taught for one hour fifteen minutes, four days a week. 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 are 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.

A typical lesson will be structured as below, however teachers will adapt the lesson to suit the needs to the individual class:

- Transition (5 to 10 minutes): This will involve whole-class work to rehearse, sharpen and develop mental and oral skills. The pupils may also be asked to respond to the teacher's next-step marking in this time.
- The main teaching input (20 to 30 minutes): This will include both teaching input and pupil activities.
- The differentiated main task (about 20 to 30 minutes): This will include teachers allowing the pupils to self-assess their learning on day 1 of a new topic. The pupils choose the appropriate task for their ability. Following on from the first lesson, the teacher will mark and assess the pupils' books after each lesson.
- A plenary (about 5 to 10 minutes): This will involve work with the whole class to address misconceptions, identify progress, to summarise key facts and ideas and what to remember, to make links to other work and to discuss next steps.



Scheme of Work

White Rose Maths outlines what pupils need to learn during each week of each term to master the learning objectives laid out by the National Curriculum. Resources that are aligned with the White Rose Maths framework are designed to be enjoyable, engaging and varied, to help pupils develop a love of learning and work towards mastery with differentiated resources. The approach to teaching maths promotes the ethos that “Everyone Can Do Maths: Everyone Can!” The scheme helps pupils work towards maths mastery and change attitudes towards this subject, encouraging a growth mindset in both teachers and learners. At Pickhurst, we adopt a White Rose Maths approach to teaching where we make sure all pupils have the same opportunities to learn and the support they need to fully grasp concepts. Teachers focus on making maths fun for pupils and help them to find enjoyment in number problems, because when pupils are engaged in learning and enjoying maths, that is when concepts are learnt and deep learning happens.

Fundamentally, the curriculum design is to support pupils to be able to perform simpler tasks so they can then move on to perform more complex tasks. For example, we cannot expect pupils to add two numbers together before they understand what each individual number represents and what it means to add. This thinking gives rise to a typical sequence of ‘blocks’ of mathematics that is present in all of the year groups. Within each of these blocks, there are ‘small steps’ which are again sequenced in order of difficulty and dependency.

We believe all pupils should have opportunities to develop reasoning and solve problems as well as develop fluency. Differentiation can be achieved, for example, through varying the degree of support provided, using enabling and extending questions, and providing or asking for alternative representations.

The school’s curriculum for maths, systematically builds mathematical knowledge and skills. This means that pupils are able to understand and draw on the



knowledge, concepts and procedures they have already learned, and apply these to where they are now in their learning, as well as in the next stage. They have opportunities to show how mathematical reasoning and problem solving can be used to solve practical problems in everyday life should be identified and made the most of. New material is divided into manageable steps, with new procedures modelled and resources and approaches are used to help pupils understand what they are learning. The scheme enables teachers to revisit pupils' previously learned knowledge, concepts and procedures to make sure that their mathematical knowledge becomes deeply embedded, encouraging rapid recall and increasing their maths confidence. The scheme also allows for flexible curriculum planning, so that lessons can be used to address any gaps in pupils' knowledge that stops them from learning new content, with assessment used to identify when they have reached the understanding they need to move on to new or more complex maths.

Every lesson incorporates Bruner's concrete, pictorial, abstract approach (CPA) which allows the pupils to develop a deep and sustainable understanding of maths.

Concrete

Concrete is the "doing" stage, using concrete objects to model problems. Instead of the traditional method of mathematics teaching, where a teacher demonstrates how to solve a problem, the CPA approach brings concepts to life by allowing pupils to experience and handle physical objects themselves. Every new abstract concept is learned first with a "concrete" or physical experience.

Pictorial

Pictorial is the "seeing" stage, using representations of the objects to model problems. This stage encourages pupils to make a mental connection between the physical object and abstract levels of understanding by drawing or looking at pictures, circles, diagrams or models which represent the objects in the problem. Building or drawing a model makes it easier for pupils to grasp concepts they



traditionally find more difficult, such as fractions, as it helps them visualise the problem and make it more accessible.

Abstract

Abstract is the “symbolic” stage, where pupils are able to use abstract symbols to model problems (Hauser). Only once a pupil has demonstrated that they have a solid understanding of the “concrete” and “pictorial” representations of the problem, can the teacher introduce the more “abstract” concept, such as mathematical symbols. Pupils are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols, for example $+$, $-$, $\times$, $/$ to indicate addition, subtraction, multiplication, or division.



Intent

The teaching of Fluency

We intend for all pupils 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 accurately and rapidly.

The teaching of Reasoning

We intend for all pupils to reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.

The teaching of Problem Solving

We intend for all pupils to solve problems by applying their mathematical 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. Opportunities to show

Mastery

We intend for all pupils to have secure long term, deep and adaptable understanding of maths which they can apply in different contexts.

Modelling

Teachers teach the skills needed to succeed providing examples of good practice and having high expectations. They also tailor their teaching to suit the needs of the pupils, whether they are visualisers, describers or experimenters.



A vocabulary rich environment

We intend to create a vocabulary rich environment, where talk for maths is a key learning tool for all pupils. Pre-teaching key vocabulary is a driver for pupil understanding and develops the confidence of pupils to explain mathematically.

Constructivist approach-Pattern and connection identification

Pupils are taught that learning occurs when actively involved in a process of meaning and knowledge construction as opposed to passively receiving information. We value collaboration, integration, reflection and promote inquiry-based learning. All pupils will have opportunities to identify patterns or connections in their maths lesson. They can use this to predict and reason and to also develop their own patterns/links in maths and other subjects.

Showcasing Female Mathematicians

Pupils are exposed to female as well as male mathematicians in order to inspire and showcase brilliant role model in a predominately male field.



At Pickhurst, through recognition of the need to prepare our children for their futures and the world of work, our curriculum is broad, balanced and inclusive. It has defined end points with a clear sequence and progression, with children attaining the crucial knowledge and skills they need by the time they leave our school.

Intent Statements	Aims	
<u>Statement 1:</u> <u>To foster effective learning behaviours (Pickhurst Core Values).</u> To develop the behaviours that learners need to succeed in the world such as: pride, respect, confidence, kindness and inquisitiveness.	<i>To be proud</i>	Evaluate their achievements through group and class discussions. Celebrate and share their achievements and those of others by acknowledging that there are other strategies that will achieve the same answer. Present their work in a neat and orderly fashion.
	<i>To be inquisitive</i>	Share and listen to a range of methods used to solve mathematical questions. Show a willingness to adapt their initial approach based on the ideas of others.
	<i>To be confident</i>	Develop the confidence to ask questions if they are unsure of how to approach a task or mathematical concept. Develop, over time, the ability to apply the arithmetic skills learnt to a range of situations and problems, demonstrating autonomy and confidence in their knowledge. Challenge themselves further during lessons and step outside of their comfort zone.
	<i>To be kind</i>	Take care of the equipment that is provided to support them in their mathematical learning. Identify peers who may need more help and show initiative when it comes to supporting others.
	<i>To be healthy</i>	Have a positive mindset even if they find maths a particularly challenging subject. Ask for support to ensure they feel confident in the task at hand. Acknowledge that some



		mathematical questions will challenge them but will not allow this to affect their confidence in the subject.
	<i>To be understanding</i>	Evaluate their achievements through group and class discussions. Celebrate and share their achievements and those of others by acknowledging that there are other strategies that will achieve the same answer.
	<i>To be respectful</i>	Coach and learn from each other to develop a stronger understanding of mathematical concepts and methods. Respect and then learn from each other's mistakes and misconceptions.
	<i>To be successful</i>	Enjoy lessons and relish the challenges of the tasks set. Put into practice a range of strategies to solve challenging mathematical problems. Show a willingness to persevere through the approach of trial and error with an awareness that some problems will take them out of their comfort zone.
	<i>To be trustworthy</i>	Take responsibility for their learning through selecting appropriate manipulatives or methods to support them in solving mathematical questions and respecting the choices of others.
<u>Statement 2:</u> <u>To nurture our children's learning journey.</u> To develop the appropriate subject specific knowledge, skills and understanding as set out in the National Curriculum. Layering knowledge across subjects so that it becomes embedded and children can flourish, reach and exceed their potential academically,		• Subject specific knowledge and skills, built around objectives within the National Curriculum, identified within Knowledge Organisers. The skills are built upon which activates prior learning. • Rationale for the way in which Maths has been organised to best layer knowledge and concepts within and across year groups. • Maths has been used to allow for meaningful links to be made across other subject areas. • 'Sticky learning' (prior learning and key concepts) is addressed at the start of each unit and lesson. The children are encouraged to recall and retrieve prior learning to support with their new knowledge & skills



physically, emotionally
and artistically.

At Pickhurst, we strive to develop our children's learning in mathematics by helping them to master each small step-which then builds up towards more complex steps. Each step is a building block to the next and teachers plan engaging, progressive lessons to guide children on their journey to mastery. We provide children with the opportunity to talk through their thinking with their peers. These opportunities enable the children to think critically about their approach to a question, providing time for discussion, reflection and evaluation.

Through coaching, children are able to not only learn from their peers, but also impart knowledge. Children are able to share what they know, a strategy they have used, or an idea on how to solve a problem. This time to talk and discuss gives children confidence and autonomy over their learning, allowing them to make their own decisions and learn from any mistakes.

Metacognition also provides children with the opportunity to think critically and structure their ideas. Time is given to the children to make links, plan and evaluate their mathematical approaches, enabling them to build on each small step. Activating prior knowledge plays a huge role in developing our learner's learning in mathematics. It enables learners to make links and practice relevant skills before applying them to a new concept. The purpose of this is to reduce cognitive load, therefore creating confident mathematicians.

By regularly sharing relevant mathematical vocabulary, pupils are provided with the language to speak like specialists. Vocabulary is discussed and used throughout every lesson. Vocabulary is on display throughout a unit for children to refer back to and make links to.

By providing children with relevant mathematical vocabulary, they are able to verbalise their thinking. This is especially relevant when answering reasoning questions. Through their understanding of relevant vocabulary, children have the confidence to explain their thinking to others.



Implementation

White Rose Maths and Deepening Understanding

Every class from Year 3,4,5,6 and ARP follows the White Rose scheme for learning which is based on the National Curriculum. Lessons may be personalised to address the individual needs and requirements for a class but coverage and progression of skills/knowledge is maintained. We use a range of other planning resources such as NCETM and NRICH to enrich our pupils' maths diet. Pupils are given opportunities to deepen their understanding by completing 'next step' tasks that either addresses a misconception, consolidate or challenge pupils.

Online Maths Tools

In order to advance individual pupils' maths skills in school and at home, we utilise Times Tables Rock Stars (TTRS) for multiplication practise, application and consolidation. Pupils are involved in competitions across the school. They use the application once a week at school and as homework.

Across the school, maths homework is set weekly via the MyMaths. This enables pupils to revisit topics, revise and consolidate. Tutorials are provided so that pupils feel supported.

Maths Gym and Consolidation/Post-Teaching

We have a morning session called Maths Gym whereby pupils are given a Problem of the Day (White Rose) to ensure general maths knowledge, fluency and reasoning are maintained, developed and consolidated based on previous learning.

These may take many forms, for example, arithmetic, specific times tables or several questions about a mixture of maths topics. While the class are solving the questions, the staff are able to support pupils with consolidation or post-teaching to fill in any gaps to ensure they are confident with skills.



Whole school events

We celebrate Nations Maths Day and Maths Week. We also plan whole school competitions such as, TTRS. These bring the whole school together to concentrate on one theme.

Impact

Pupil Voice

Through discussions and feedback, pupils talk enthusiastically about their maths lessons and speak about how much they love learning about maths. They can articulate the context in which maths is being taught and relate this to real life purposes. Pupils show confidence and believe they can learn about a new maths area and apply the knowledge and skills they already have. Having the freedom to choose the activity and level of difficulty, has allowed them to self-select effectively.

Evidence in Knowledge

Pupils know how and why maths is used in the outside world and in the workplace, they know about different ways that maths can be used to support their future potential. Mathematical concepts or skills are mastered when pupils can show it in multiple ways using the mathematical language to explain their ideas and can independently apply the concept to new problems in unfamiliar situations. Pupils demonstrate a quick recall of facts and procedures. This includes recollection of the times tables.

Evidence in Skills

Pupils use acquired vocabulary in maths lessons they have the skills to use methods independently and show resilience when tackling problems. Pupils have the flexibility to fluidly move between different contexts and representations of maths. Pupils show a high level of pride in the presentation and understanding of the work. This is reflected through their books and self- reflections on the Steps for Success. Pupils are given the chance to develop the ability to recognise relationships and make



connections in maths lessons. Teachers plan a range of opportunities to use maths inside and outside school.

Outcomes

At the end of each year we expect the pupils to have achieved Age Related Expectations (ARE) for their year group. Some pupils will have progressed further and achieved greater depth (GD). Pupils who have gaps in their knowledge receive appropriate support and interventions.

Resources

1. Maths Gym – to reinforce previously taught concepts, providing opportunities for pupils to revisit, revise and consolidate.
2. Lessons based on the White Rose scheme of work.
3. Times Tables Rock Stars (TTRS)
4. MyMaths- given to pupils as part of their weekly homework.

Cross-curricular

Mathematics contributes to many subjects and it is important the pupils are given opportunities to apply and use Mathematics in real contexts across a range of foundation subjects. It is important that time is found in other subjects for pupils to develop their mathematical skills, e.g. there should be regular, carefully planned opportunities for measuring in science and technology, for the consideration of properties of shape and geometric patterns in technology and art, and for the collection and presentation of data in history and geography. We endeavor at all times to set work that is challenging, motivating and encourages the pupils to talk about what they have been doing.

Whole School Involvement

Parents and SLT are kept informed of what is being taught weekly via our School Newsletters. Weekly homework is set on MyMaths to allow pupils to revisit topics taught that week. The calculation policy is on the school's website to ensure parents



are aware of the methods and changes to the methods. Home Learning workbooks are also available on the school's website which is part of our catch-up recovery programme.

Equal Opportunities

In keeping with the school policy on Equal Opportunities the teacher will be aware of the differences and individual needs of each pupil with regard to the physical, emotional, behavioural and learning needs, as well as any special abilities and any needs that may arise as a result of race or gender.

Pupils with special educational needs and individual education plans

Teachers include all pupils fully in their daily mathematics lessons. All pupils benefit from the emphasis on oral and mental work and participating in watching and listening to other pupils demonstrating and explaining their methods. However a pupil whose difficulties are severe or complex may need to be supported with an individualised programme in the main part of the lesson.

Marking

Marking of work is done after each lesson. Pupils must self-assess their learning from each lesson. We use a system of: three-sided triangle, 2-sided triangle or a 1-sided triangle to represent how much progress the pupil made during the lesson.

Next-step marking takes place regularly in maths, to support the pupil in knowing how to improve their work even further. Our SEND and PPG children access more regular marking with at least 2 next-step marking each week.

Assessment

Through our teaching, we continually monitor pupils' progress against expected attainment for their age, making formative assessments where appropriate and using these to inform our planning and teaching. Pupils will assess their own learning in lessons by using the 'triangle' system. Teachers mark and assess the pupils' books after each lesson. Summative assessments are completed at the end of each term,



where their data is inputted onto a gap analysis spreadsheet that clearly highlight areas the pupils need to work on which inform planning and teaching. They are also used in pupil progress discussions, Parents' Evening/Parents' Consultation Day and end of year reports. The assessments allow us to ensure we are providing excellent provision for every pupil.

Health and Safety

Health and safety arrangements are in line with the school policy.

Role of the Mathematics Coordinator

The mathematics coordinator is responsible for coordinating mathematics through the school. This includes:

- Ensuring continuity and progression from year group to year group.
- Providing all members of staff with guidelines and a scheme of work to show.
- How aims are to be achieved and how the variety of all aspects of mathematics is to be taught.
- Advising on in-service training to staff where appropriate. This will be in line with the needs identified in the SDP and within the confines of the school budget.
- Advising and supporting colleagues in the implementation and assessment of mathematics throughout the school.
- Assisting with requisition and maintenance of resources required for the teaching of mathematics. Again this will be within the confines of the school budget.
- Working with the SENCO and the headteacher on whole school issues.
- Working in partnership with the SENCO providing specific programmes and intervention for pupils with special educational needs.



**“Doing Mathematics
should always mean
finding patterns and
crafting beautiful and
meaningful
explanations.”**

Paul Lockhart