Princefield First School Mathematics Policy

THE NATURE 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."
(The New National Curriculum in England framework document, July 2013)

Mathematics is a tool for everyday life. It is a whole network of concepts and relationships which provide a way of viewing and making sense of the world. It is used to analyse and communicate information and ideas and to tackle a range of practical tasks and real life problems. It also provides the materials and means for creating new imaginative worlds to explore.

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.

Using the Programmes of Study from the New National Curriculum we aim to develop:

- An enjoyment and curiosity of mathematics and for children to feel confident to become successful;
- Children's abilities to use and apply mathematics to solve problems in both the classroom and in 'real life' contexts;
- A confidence to communicate ideas in written form and orally;
- Independent and collaborative ways of working, encouraging children to share ideas and solve problems together;
- A wide range of mathematical vocabulary to be modelled and used in the classroom environment;
- The children's ability to recall mental facts accurately and quickly and using effective written calculation methods;
- Children's logical thinking, reasoning and ability to problem solve as transferable life skills.

NEW CURRICULUM OUTLINE FOR EACH KEY STAGE

EYFS

Pupils are encouraged to develop their Problem Solving, Reasoning and Numeracy in a broad range of contexts in which they can explore, learn, enjoy, practise, discuss and extend their skills. Pupils are encouraged to exploit their mathematical potential in both indoor and outdoor enabling environments. They are provided with a wide range of activities that promote regular active participation, exploration of real life problems, development of imaginative play and early experience of mathematical language. All pupils are supported positively and encouraged to gain confidence and competence in their skills. By the end of the Foundation Stage pupils should be able to count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number, using quantities and objects, add and subtract two single-digit numbers and count on or back to find the answer. Solve problems, including doubling, halving and sharing. The children should be able to use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems. Recognise, create and describe patterns. Explore characteristics of everything objects and shapes and use mathematical language to describe.

Key Stage 1

The principal focus of mathematics teaching in Key Stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the four operations, including with practical resources (e.g. concrete objects).

At this stage, pupils should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.

By the end of Year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.

Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at Key Stage 1.

Lower Key Stage 2 – Years 3-4

The principal focus of mathematics teaching in lower Key Stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.

By the end of Year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.

Assessment

At Princefield First School we recognise that assessment for learning lies at the heart of promoting learning and raising standards of attainment.

The formative assessment procedures within our school consist of:

- Making ongoing assessments through questioning, discussion and observations
- Fast feedback in books is in response to the achievement of the learning or to correct any difficulties encountered.
- Self-assessment using the system of 'The Learning Pit,' smiley faces, children completing success criteria's and learning conversations.
- Use of a teacher's own test or activity designed to check understanding.

The summative assessment procedures consist of:

- A termly teacher assessment –PUMA
- GL Assessments at the end Yr1-Y4
- Use of SATs and optional SATs papers in Year 2
- Teacher assessment linked to the Maths Key Skills Grids.

Maths Curriculum Planning

Mathematics is a core subject in the National Curriculum and we use the objectives from this to support planning and to assess children's progress.

Staff use long term planning to ensure coverage of all areas of the National Curriculum and medium term planning to differentiate objectives according to the set which they teach. It is the class teacher who completes the weekly plans for the teaching of mathematics. These weekly plans list the specific learning objectives for each lesson and give details of how the lessons are to be taught. The class teacher keeps these individual plans, which they annotate according to the success of the lesson.

Lessons

In lessons, learning objectives and success criteria are clearly displayed and discussed.

The emphasis in lessons is to make teaching interactive and lively, to engage all children encouraging them to talk about mathematics. Lessons involve elements of:

- Instruction – giving information and structuring it well;
- Demonstrating – showing, describing and modelling mathematics using appropriate resources and visual displays;
- Explaining and illustrating – giving accurate and well paced explanations;
- Questioning and discussing;
- Consolidating;
- Reflecting and evaluating responses – identifying mistakes and using them as positive teaching points;
- Summarising – reviewing mathematics that has been taught enabling children to focus on next steps

Enable maths talk daily through:

o open-ended questioning

o What do you notice?

o What's the same? What's different?
o Which is the odd one out?
o Is it always true, sometimes true or never true?
o Encourage pupil questioning

Pupils' Records of work

Children are taught a variety of methods for recording their work and are encouraged and helped to use the most appropriate and convenient. Children are encouraged to use mental strategies and their own jottings before resorting to more formal written methods. Children's own jottings & pictorial representations to support their work is encouraged throughout all year groups.

What is mastery?

"A mathematical concept or skill has been mastered when a person can represent it in multiple ways, has the mathematical language to communicate related ideas, and can independently apply the concept to new problems in unfamiliar situations. Mastery is a journey and a long-term goal, achieved through exploration, clarification, practice and application over time." (Mathematics Mastery)

Models and images

One such approach is the use of CPA (Concrete- Pictorial-Abstract) which ensures children meet a progressive range of tactile models to help them understand a concept (for example, the number five may be represented first with a group of five teddy bears and later with five joined plastic cubes) before moving to images that help children to visualise the concept (for example, five dots on a drawing of a ladybird or as seen on dice), before tackling the abstract (for example the written figure: 5, which even when recognised, has no actual meaning other than a peculiar squiggle which adults call "five", without the preceding models and images).

Mathematical Language

The 2014 National Curriculum is explicit in articulating the importance of children using the correct mathematical language as a central part of their learning (*reasoning*). Indeed, in certain year groups, the non-statutory guidance highlights the requirement for children to extend their language around certain concepts.. New vocabulary should be introduced in a suitable context (for example, with relevant real objects, apparatus, pictures or diagrams) and explained carefully. High expectations of the mathematical language used are essential, with teachers only accepting what is correct.

Mathematical Language

High expectations of the mathematical language used are essential, with staff only accepting what is correct. Consistency across the school is key:

Correct Terminology	Incorrect Terminology
ones	units
is equal to (is the same as)	equals
zero	oh (the letter o)
exchange exchanging regrouping	stealing borrowing
calculation equation	generic term of 'sum' or 'number sentence'

Cross curricular
Opportunities are used to draw mathematical experiences out of a range of activities in other subjects, such as in PE, Science and Geography, to enable children to apply and use Mathematics in both real life and academic contexts and make links.

Resources
• The use of Mathematics resources is integral to the concrete – pictorial – abstract approach and thus planned into our learning and teaching. (This is linked to our Calculation Policy)
• We have a wide variety of good quality equipment and resources, both tangible and ICT based, to support our learning and teaching.
• These resources are used by our teachers and children in a number of ways including: Demonstrating or modelling an idea, an operation or method of calculation, e.g.: a number line; place value cards; dienes; money or coins; measuring equipment for capacity, mass and length; bead strings; the interactive whiteboards and related software; 3D shapes and/or nets; Numicon and related resources and software; multilink cubes; clocks; protractors; calculators; dice; number and fractions' fans; individual whiteboards and pens; and 2D shapes and pattern blocks, amongst other things;
• Resources within individual classes are accessible to all pupils who should be encouraged to be responsible for their use.
• Further resources (often larger items shared by the whole school) are located in the Mathematics cupboard.
• A range of Mathematics related software is also available and this is accessible via the shared server, which children can access when projected onto the Interactive Whiteboards in each classroom; by using individual Ipads; or by using the Computing suite as a whole class.
• Teachers are encouraged to use the school playgrounds/grounds/Hall as an outdoor classroom when possible, for example, when teaching Maths of the Day, Active Maths Activities.

Homework (please refer to the School's Homework Policy)
• Mathematics homework is set for children in EYFS regularly to support maths learning at home.
• Mathematics homework is set for children in Years 1-4 fortnightly.
• Homework provides opportunities for children to: practise and consolidate their skills and knowledge; develop and extend their techniques and strategies; and prepare for their future learning through out of class activities and homework.
• Homework activities are varied, interesting and fun so that the children are motivated; the tasks compliment the area of Mathematics being taught that week.

Parental Involvement
We recognise that parental involvement is an important factor in helping children achieve their best and actively encourage parents to become involved with their children's development in Mathematics through:

- Parents' meetings
- Interim reports and end of year report;
- Attending open mornings or drop-in sessions;
- Supporting homework and practice of mental maths targets and multiplication tables;
- Encouraging the use of Sumdog for online learning

Inclusion & Equal Opportunities
We aim to provide for all children so that they achieve as highly as they can in Mathematics

according to their individual abilities. All children have equal access to the Mathematics curriculum and to suitable learning opportunities regardless of gender, disability, ethnicity or home background. All children regardless of ability have their progress reviewed and 'additional to' and 'different from' provision is planned accordingly.

Special educational needs & disabilities (SEND)

Daily mathematics lessons are inclusive to pupils with special educational needs and disabilities. Where required, children's APDR's incorporate suitable objectives from the National Curriculum for Mathematics or development Matters and teachers keep these in mind when planning work. These targets may be worked upon within the lesson as well as on a 1:1 basis outside the mathematics lesson. Maths focused intervention in

school helps children with gaps in their learning and mathematical understanding. These are delivered by trained support staff and overseen by the SENCO and/or the class teacher.
Within the daily mathematics lesson teachers have a responsibility to not only provide differentiated activities to support children with SEND but also activities that provide sufficient challenge for children who are high achievers. It is the teachers' responsibility to ensure that all children are challenged at a level appropriate to their ability.

Equal Opportunities

Positive attitudes towards mathematics are encouraged, so that all children, regardless of race, gender, ability or special needs, including those for whom English is a second language, develop an enjoyment and confidence with mathematics. This policy is in line with the school's 'Racial Equality' policy.
The aim is to ensure that everyone makes progress and gains positively from lessons and to plan inclusive lessons. Lessons involving lots of visual, aural and kinaesthetic elements will benefit all children including those for whom English is an additional language (EAL).
Differentiated questions are used in lessons to help children and planned support from Teaching Assistants and other adults.

Role of the Maths Co-ordinator

The subject leader will be responsible for improving standards of teaching and learning in Mathematics through:

- Regular reviews of pupils' progress
- Provision of Maths including specific interventions and additional support
- The quality of the learning environment for maths
- Taking the lead in policy development
- Auditing and supporting colleagues in their CPD
- Purchasing and organising resources
- Keeping up to date with developments in the assessing, teaching and learning in Maths
- Challenging staff to achieve the best standards possible at all key stages

Additional Related Polices

Calculation Policy