

Achieving Academic Excellence & Intellectual Curiosity in Maths

At Hackney New Primary School, we strive for Academic Excellence and intellectual curiosity for all, and with this in mind, we place problem-solving, reasoning and investigative skills at the heart of our mathematics teaching. The National Curriculum expects that all pupils

- become fluent in the fundamentals of mathematics...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, and
- can solve problems by applying their mathematics to a variety of routine and nonroutine problems with increasing sophistication.

At HNPS, these skills are embedded within maths lessons and are developed consistently over time.

How do we do this?

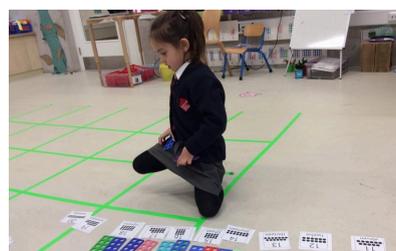
At our school, all children receive one hour of mathematics instruction each day. Mathematical topics are taught in blocks, to enable the achievement of 'mastery' over time. Programmes of study are organised into progressive sequences which both consolidate prior learning and allow for frequent and varied practice of core mathematical skills to develop fluency, reasoning and problem solving skills.

Developing fluency

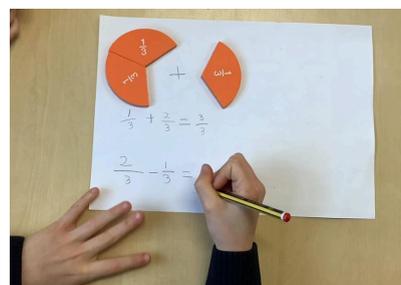
Fluency in maths means both the knowledge of mathematical facts and being able to recall these facts quickly, as well as the ability to apply these skills in a variety of different contexts.

We believe that in order for children to develop fluency in any mathematical concept, they first need to understand that concept. Similarly, we do not believe in teaching a child a mathematical procedure to follow without them first understanding its underlying principles. In order to achieve this, lessons provide opportunities for repeated and varied practice of concepts, with new concepts being introduced in three distinct phases; concrete, pictorial and then abstract.

Concrete



This is the ‘doing’ stage’. When beginning to understand new concepts, children use manipulatives such as cubes, numicon, counters, base 10 and fraction wheels to physically solve problems. These concrete resources are especially useful in developing a solid understanding of number in Key Stage One. Concrete manipulatives are also used when introducing new concepts in Key Stage Two such as using fraction wheels to understand the concepts of



addition, subtraction and equivalence of fractions.

Pictorial

Next on the journey to developing fluency, is the ‘seeing’ stage. Children are taught to draw diagrams such as bar models, part-whole models and number lines; and to draw the concrete manipulatives to help them make a connection between the physical objects of the concrete stage. Representing maths problems pictorially allows children to grasp more abstract concepts.



Abstract

Finally, children progress to the abstract stage of fluent understanding. This is when children use numbers and symbols to represent a maths problem. In this stage, children are taught formal written methods, such as addition, subtraction, multiplication and division. To ensure consistency throughout the school, all class teachers follow the same methods as outlined in the Methods Guidance and Expectations documents, for the four operations of addition, subtraction, multiplication and division as well as fractions.

Mastering Number

In addition to using concrete, pictorial and abstract throughout the entire school, EYFS and Key Stage 1 classes participate in the NCETM approved Mastering Number programme. In EYFS this takes the form of maths lessons,

whereas in years 1 and 2 children participate in a 15 minute Mastering Number session in addition to their maths lesson each day. Mastering Number aims to secure firm foundations in the development of number sense for all children from Reception through to Year 2. It aims to do this by developing **fluency** in number facts that are recalled with automaticity and number sense- and **flexibility** and confidence with numbers that employ mathematical structure and relationships. This programme has been recommended by DfE and Ofsted as a means of ensuring all children achieve fluency in number by the end of Key Stage 1.

Repeated practice

We realise that regular, repeated practice is the best way to ensure that key mathematical facts are committed to long-term memory and can thus be recalled promptly for use in mathematics work. Each year group has a set of 6 Key Instant Recall Facts (known as KIRFs) to be practised and learned until automacy has been obtained. These are designed to support the development of the mental skills that underpin much of mathematics work in lessons in the primary years and beyond. These are particularly useful when calculating and include practice in addition, subtraction, multiplication and division. Each child has a weekly low-stakes quiz in class which has been designed for children to be able to measure their own progress week by week, be it in the score they receive, or the time they take to complete the quiz.

In addition, each lesson begins with 2 distinct recap and recall activities designed to consolidate and deepen prior knowledge. The first of these, Strengthen It, consists of one or two questions to consolidate previously taught objectives. These are aligned with the HNPS Ready to progress Criteria and do not align with the subject matter for the rest of the lesson. Medium Term Plans outline which criteria are strengthened each week. The same objective is strengthened for 5 sessions, increasing in complexity each day.

The second is Reinforce it. This consists of one or two questions to consolidate key knowledge and skills from the most recent lesson on the subject matter for that lesson. This may be to address misconceptions or deepen understanding. As this is linked to the rest of the lesson, teachers may use this to adapt their lesson. If teachers identify a gap or misconception, this should be addressed before moving on to the new content of the lesson.

Reasoning mathematically

We believe that reasoning mathematically is not only an essential component of a maths curriculum, but provides joy and engagement for all maths learners. While some maths may need to be taught discretely, there is an emphasis on giving the maths an appropriate context so there is a purpose for what children are learning. New concepts are often shared within the context of an initial related problem, which children are able to discuss in partners to choose the correct strategy or skill to solve a problem. This initial reasoning activity prompts discussion as well as promoting an awareness of maths in relatable real-life contexts that link to other areas of learning. Each lesson includes reasoning activities for children to attempt in pairs and independently. Children are encouraged to discuss how they arrived at an answer, why they took particular steps to get there and to choose the most efficient method of solving a given problem.

Becoming practised at solving problems

Problem solving in maths follows directly from fluency and reasoning, in that it is using a strategy or skill to solve a type of problem that children have not directly been instructed in.



Children are invited to answer a variety of problems linked to the curriculum from nrich.org and National Centre for Excellence in Teaching of Mathematics among others. Throughout the teaching block, children have regular opportunities to solve problems with more than one answer and class teachers use worked examples to analyse the use of different strategies and their efficacy.

Each lesson phase provides the means to achieve greater depth, with high potential mathematicians being offered rich and sophisticated problems, as well as exploratory, investigative tasks, within the lesson as appropriate

Consolidation and Assessment

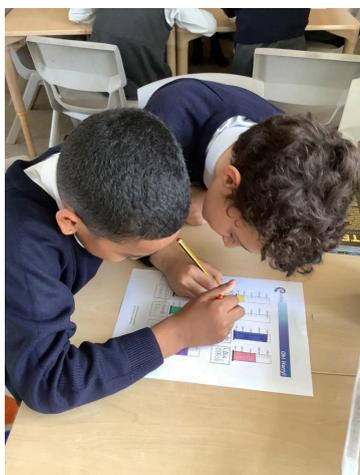
reading appropriate, up to date literature and research around our practice. We also recognise that assessment and monitoring is more effective when it is developmental and not judgemental. At HNPS, the regular monitoring of our maths provision consists of learning walks, pupil and teacher voice monitoring and book looks. All teaching staff are given feedback following this monitoring and achievements are celebrated and next steps are planned to ensure teaching is developed.

Working with other leaders within the Eko Trust

Each school year, maths leaders work together to share best practice in all Eko's schools. In these sessions, leaders share their maths teaching and learning to moderate consistency and expectations. We find this a valuable tool to develop our pedagogy and network with teachers with a clear focus on the teaching and leading of maths.

Intellectual Curiosity

We believe that one of the main joys in maths is not of knowing the answer, but working to solve the answer. We want all children to enjoy mathematics and to experience success in the subject, by nurturing their ability to reason mathematically and draw upon a variety of mathematical skills and strategies to solve problems. We are committed to developing children's curiosity about the subject, as well as an appreciation of the beauty and power of mathematics. We are committed to ensuring that children are able to recognise the importance of maths in the wider world and that they are also able to use their mathematical skills and knowledge confidently in their lives in a range of different contexts.



Challenging all learners

We intend for all children to welcome challenges and consequently, teachers foster the attitude that we all, even the most able among us, should expect to be challenged before achieving success. Furthermore, we are committed that all children experience success in each lesson. To this end, new material is introduced only when knowledge and skills are secure. Those children who grasp concepts rapidly are challenged through being offered rich problems before moving on to new content. Using the school environment and the wider world, the curriculum makes sure that children explore, make

connections, seek patterns, recognise relationships and are creative with mathematics. Maths and Number Days are used to broaden both teacher and child experiences in mathematics and are reflective of the wider community.

Parental engagement

We know the importance of building confidence in and enjoyment for maths within our wider school community. To this end, we invite parents to workshops tailored to their child's phase so that they have an awareness not only of what is taught, but also how we teach. These also provide detailed examples of what parents can do to support their child in their maths learning. We also invite parents to Intellectual Curiosity, Academic Excellence and Self Belief learning together sessions. We promote practice of learning times tables at home through use of Times Table Rockstars and have regular competitions within and between year groups.