

Cranford Park Academy

Mathematics Policy

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.

2014 National Curriculum

At Cranford Park Academy, we believe all children, no matter their starting point, can and will achieve in mathematics. Our pupils understand the important role of mathematics and how it is an essential part of our everyday lives. The careers our pupils choose to pursue in the future will have mathematics at their core; it is therefore crucial we develop mathematicians who are knowledgeable, curious and creative and this is achieved through an engaging curriculum where a mastery approach is at its core.

Through our maths lessons, our pupils will:

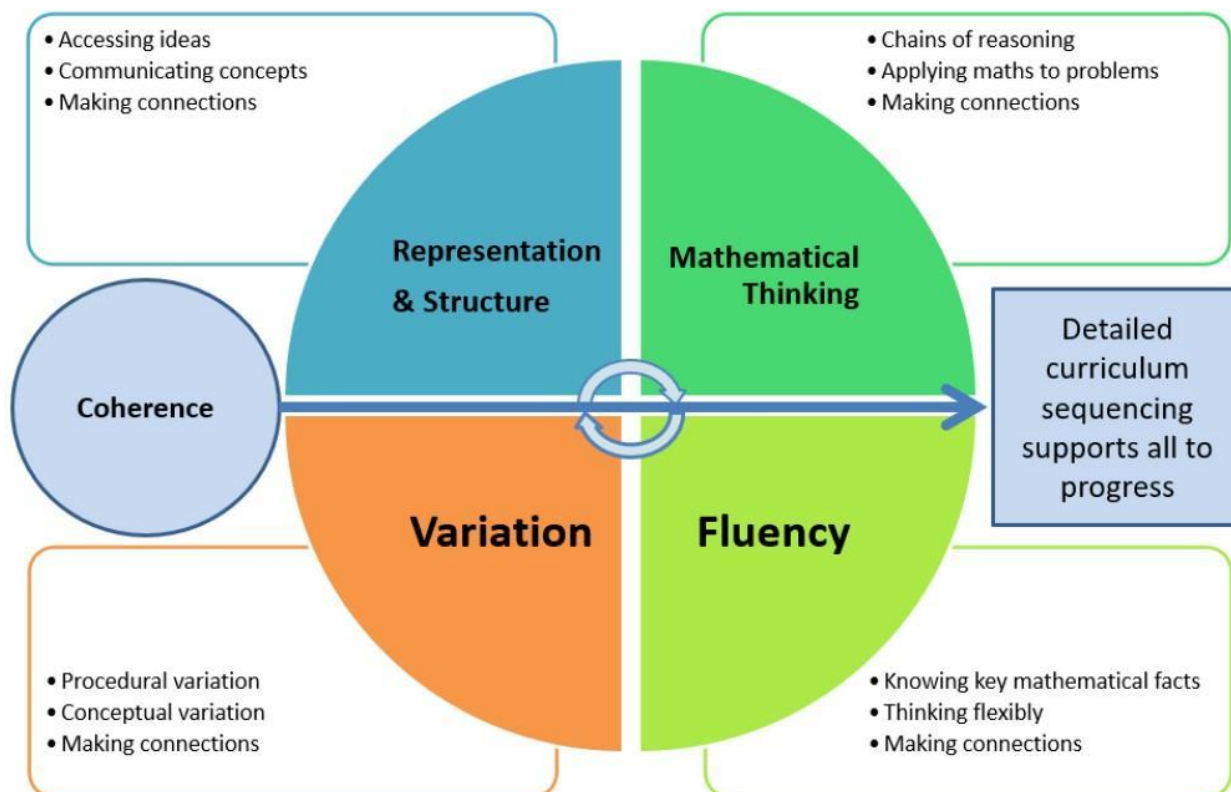
- learn and enjoy mathematics, no matter their starting point, succeeding and making good progress.
- focus and engage fully as learners who seek patterns, reason, and look for connections between mathematical concepts.
- develop a resilient and positive 'can do' attitude towards their learning.
- use the CPA approach, which is built into the White Rose Maths schemes of learning we follow, using a range of models and manipulatives to develop both procedural fluency and conceptual understanding.
- become fluent in the fundamentals of mathematics, so they develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- have a range of strategies, mental and written, choosing the most efficient method when answering questions.
- reason mathematically, by conjecturing relationships and generalisations, develop an argument by following a line of enquiry, justifying or providing proof using mathematical language.
- have a range of strategies to solve problems, applying their knowledge and understanding with increasing sophistication including breaking down problems into a series of simpler steps, using trial and error etc. and persevering in seeking solutions.

Teaching Maths through a Mastery Approach (1)

At Cranford Park Academy, we follow a mastery approach to mathematics which means pupils of all ages acquiring a deep, long-term, secure and adaptable understanding of the subject. The phrase 'teaching for mastery' describes the elements of classroom practice and school organisation that combine to give pupils the best chances of mastering maths. Achieving mastery means acquiring a solid enough understanding of the maths that has been taught to enable pupils to move on to more advanced material.

The Five Big Ideas in Teaching for Mastery

Teaching for Mastery



Our teaching for mastery is underpinned by the NCETM's 5 Big Ideas.

1. Coherence

Teaching is designed to enable a coherent learning progression through the curriculum, providing access for all pupils to develop a deep and connected understanding of mathematics that they can apply in a range of contexts.

2. Representation and Structure

Teachers carefully select representations of mathematics to expose mathematical structure. The intention is to support pupils in 'seeing' the mathematics, rather than using the representation as a tool to 'do' the mathematics. These representations become mental images that students can use to think about mathematics, supporting them to achieve a deep understanding of mathematical structures and connections.

CPA (Concrete Pictorial Abstract) is a three-step instructional approach that has been found to be highly effective in teaching maths concepts.

Concrete

- The 'doing' stage – physically moving objects to explore a concept.
- Every abstract concept can first be introduced using physical, concrete objects.

Pictorial

- The 'seeing' stage – images used to represent the objects.

- This stage encourages children to make a mental connection between the physical object they just handled and the abstract pictures, diagrams or models that represent the objects from the problem.
- Building or drawing a model makes it easier for children to grasp difficult abstract concepts (for example, fractions). Simply put, it helps children visualise abstract problems and make them more accessible.

Abstract

- The ‘abstract’ stage – symbols and numbers are used to model the problem or calculation.
- At this stage we use operation symbols (+, −, ×, ÷) to indicate the four operations.

MAKING CPA WORK

Although CPA has been presented as three distinct stages, a skilled teacher **will go back and forth between each stage to reinforce concepts.**

3. Mathematical Thinking

Mathematical thinking is central to how pupils learn mathematics and includes looking for patterns and relationships, making connections, conjecturing, reasoning, and generalising. Pupils should actively engage in mathematical thinking in all lessons, communicating their ideas using precise mathematical language.

4. Fluency

Efficient, accurate recall of key number facts and procedures is essential for fluency, freeing pupils’ minds to think deeply about concepts and problems, but fluency demands more than this. It requires pupils to have the flexibility to move between different contexts and representations of mathematics, to recognise relationships and make connections, and to choose appropriate methods and strategies to solve problems.

5. Variation

The purpose of variation is to draw closer attention to a key feature of a mathematical concept or structure through varying some elements while keeping others constant.

- Conceptual variation involves varying how a concept is represented to draw attention to critical features. Often more than one representation is required to look at the concept from different perspectives and gain comprehensive knowledge.
- Procedural variation considers how the student will ‘proceed’ through a learning sequence. Purposeful changes are made in order that pupils’ attention is drawn to key features of the mathematics, scaffolding students’ thinking to enable them to reason logically and make connections.

(1) This section of the document has been created using content provided by the NCETM.

White Rose Maths (2)

We use the White Rose Maths schemes of learning as a starting point to develop maths lessons which are tailored to the needs of all our pupils. The White Rose Maths curriculum embraces the National Curriculum aims, and provides guidance to help pupils to become:

- **Visualisers** – we use the CPA approach to help pupils understand mathematics and to make connections between different representations.

- **Describers** – we place great emphasis on mathematical language and questioning so pupils can discuss the mathematics they are doing, and so support them to take ideas further.
- **Experimenters** – as well as being fluent mathematicians, we want pupils to love and learn more about mathematics.

A key aim of the White Rose Maths scheme of learning is to be inclusive for all pupils. They encourage the use of one curriculum that works for all, with everybody studying the same topic and being provided with support and challenge as needed; supporting pupils to be able to perform simpler tasks so they can then move on to perform more complex tasks.

Many of the teaching strategies they advocate for all pupils are particularly useful for pupils with SEND. For example, using concrete and pictorial representations and revisiting topics; developing pupils' retention of the knowledge learnt. There are multiple opportunities for pupils to revisit topics again in new contexts. This enables teachers to support students who have struggled with a topic to spend more time reconsidering and developing their understanding. We also use the White Rose Maths Flashback 4 activities daily to assess what has been learnt and help identify where an intervention might be needed.

The mathematical objectives for each year group are organised into a sequence of 'blocks' of mathematics. Within each of these blocks, there are connected 'small steps' which are sequenced in order of difficulty and dependency. Each small step builds carefully from the previous step, building on pupils' prior knowledge to develop new skills. The lesson journey, for each small step, should be detailed and evident on Smart Notebook or PowerPoint flipcharts; there is no requirement for teachers to produce separate detailed written plans.

Lesson design includes the highlighting of potential misconceptions so these are exposed to pupils and identified in advance with many examples of where pupils could go wrong, and challenging them to spot, explain and rectify errors. Pupils' responses to these prompts helps teachers to identify and tackle misunderstandings early on rather than let these incorrect ideas become established in pupils' minds.

Key questions are carefully planned, to challenge thinking and develop learning for all pupils.

Contexts and representations are carefully chosen to develop reasoning skills and to help pupils to link concrete ideas to abstract mathematical concepts.

We use high quality materials and tasks to support learning, so pupils of all abilities are challenged. The independent tasks are differentiated into layers, which pupils select, with the support of adults, in order to challenge and show progression from their starting point, which is assessed at the start of each lesson. These tasks include the use of White Rose Maths learning and assessment materials in the main but we can also include Twinkl White Rose Mastery materials, NCETM Mastery Assessment materials, Testbase, NRICH and concrete and visual resources.

We have additional opportunities for fluency practice, such as the instant recall of key facts, as well as developing the retention of mathematical knowledge which are provided outside the daily mathematics lessons e.g. soft starts at the start of the school day, Mastering Number Programme (in Reception and KS1), intervention groups and mastery sessions.

(2) This section of the document has been created using content provided by White Rose Maths.

The Mastering Number Programme (3)

Since Autumn 2021, our Reception and Key Stage 1 pupils have been provided additional maths sessions through the Mastering Number Programme. The programme aims to secure firm foundations in the development of good number sense for all children from Reception through to Year 1 and Year 2. The aim over time is that children will leave KS1 with fluency in calculation and a confidence and flexibility with number.

The resources, provided by the NCETM, deliver teaching materials for four short sessions each week, approximately 10 minutes, and is aimed at developing children's fluency and flexibility with number. We have a lead teacher who will also contribute to an online community to share practice and engage in critical reflection.

This programme supports all our pupils to:

- develop and demonstrate good number sense.
- develop a secure understanding and build firm mathematical foundations.
- learn strategies which are focused on developing fluency in calculation and number sense.
- know how to use the appropriate manipulatives to support their understanding of mathematical structures.

(3) This section of the document has been created using content provided by the NCETM.

Marking and Feedforward

The marking of mathematical tasks is completed in line with our 'Marking and feedforward policy.' Hot marking, during the daily maths lesson, is encouraged where possible so pupils are given feedforward information through questioning and misconceptions/errors are addressed immediately.

At Cranford Park Academy, feedforward aims to:

- Be positive, motivating, and constructive for pupils.
- Assess children's learning.
- Focus on moving learning forward.
- Provide consistency and continuity in marking throughout the school.
- Ensure children have a clear understanding of teacher expectations and the feedforward and marking system.
- Use child-friendly language.
- Use feedforward and marking as a tool for formative assessment.
- Improve standards and equip pupils with specific information/skills that give them the confidence to immediately improve learning outcomes.
- Develop children's self-esteem through praise and value of achievements – recognising, sharing and discussing learning successes.
- Provide verbal feedforward and marking that has a true impact on learning. It must be timely, and actionable.

Effective Feedforward:

- Is given verbally throughout a lesson for immediate impact.
- Gives children feedforward about strengths and weaknesses in their work.
- Rewards and encourages effort and progress.
- Identifies individual children and groups who need specific help.
- Provides a record of progress.
- Informs future planning.

- Is adaptable for different stages of school life.

Marking and feedforward policy 2022

It is essential that all marking picks up and addresses any misconceptions/errors and thorough questioning ensures pupils have clarified their thinking clearly. Next steps are not necessary for each independent task because the next lesson is normally the next step in the learning sequence.

Feedforward in EYFS

- All maths feedforward is verbal.
- Maths assessment is all completed on Learning Journals on Evidence Me when relevant next steps are attached along with photographs.

Feedforward in Key Stage 1

- When possible, hot marking should be undertaken during the lesson so feedforward is immediate, and pupils can respond and correct errors/misconceptions straight away.
- Correct work to be marked in pink and errors to be marked in green.
- Next steps to be given.
- Children to be given time at the start of each lesson to make their corrections.

Feedforward in Key Stage 2

- When possible, hot marking should be undertaken during the lesson so feedforward is immediate, and pupils can respond and correct errors/misconceptions straight away.
- Next steps to be given.
- Children to be given time at the start of each lesson to make their corrections and respond to next steps.

Assessment and Record Keeping

Assessment in mathematics is continuous and on-going; there are assessment opportunities in every lesson. During each lesson, teachers assess which pupils demonstrate procedural fluency through the quick, accurate and efficient calculation of correct answers. Teachers also look for pupils who are able to apply their understanding of mathematics flexibly in new and unfamiliar situations. These on-going assessments allow teachers to adjust their teaching during the lesson as well as in the planning of future lessons.

In addition to the formative assessment undertaken in lessons, teachers use the White Rose Maths end of block assessments as quizzes, in Years 1 to 6, to assess pupils' understanding at the end of each block of learning. Another summative assessment is the PUMA end of term tests during assessment week to support our teacher assessment judgements and provide further opportunities to identify gaps in pupil learning and tailor future lessons and possible interventions.

Teacher judgements are then entered onto Insight each term. The recorded data from all assessments are used to track pupil progress and are discussed by the class teacher, Year Team Leader, Vice Principal, SEND team and SLT during termly Strategy Meetings. These meetings assist class teachers and Year Team Leaders to make adaptations to planning and if required, to plan specific interventions to ensure the needs of all children are met.

Inclusion

Our teachers are aware of pupils with identified special educational needs and disabilities and plan for their needs accordingly. These adaptations are also made based on the advice and guidance from the Director of Inclusion, the SENco for each phase, and external professionals. The provision for pupils with special needs is also detailed in the SEND Policy.

SEND pupils may be supported by additional adults such as Learning Support Assistants, provided with different resources, activities may be adapted, and STEM sentences to develop the use of mathematical vocabulary. Some pupils with additional needs may also complete additional activities outside of the daily maths lesson or be taught in a smaller class size (in Years 5 and 6 as well as in Laurel and Bonsai groups).

We have high expectations of all pupils and strongly believe that all pupils can achieve in mathematics. Some pupils may take longer to grasp concepts and may need careful scaffolding and/or extra time and support.

Home-School Links

Parents and carers have a valuable role in supporting their child's mathematical learning.

Parents and carers are supported through:

- regular 'How to Help' sessions which run throughout the year.
- meetings which explain key points in their child's mathematical journey e.g. sections within the Welcome to Nursery/Reception meetings, KS1 SATs information evening, Multiplication Tables Check meeting in Year 4, KS2 SATs information evening etc.
- access to online platforms, Times Tables Rock Stars and One Minute Maths so parents can support their child at home.
- parents evening meetings, which run twice a year, to discuss their child's progress.
- written report on the progress made in mathematics in their child's end of year report.
- the mathematics page, on our academy website, provides an overview of the mathematics teaching for each year group and the White Rose Maths calculation policies which explains the written and mental strategies used in our maths lessons.
- weekly home learning activities will consolidate what pupils have been learning in class or recap knowledge/skills/strategies from previous learning to develop retention.

Continued Professional Development

We are in the Refinement phase of the NCETM's Teaching for Mastery in Maths (Primary School Pathway) with support from the London Central and West Maths Hub. The LCW Maths Hub, through their sustaining work group, supports us to build on the work completed previously in the Mastery in Maths program. Year-on-year participation in the sustaining work group becomes an ongoing aspect of professional development for our academy. Through these meetings, we use mastery approaches consistently and improve learning in maths by strengthening leadership, refining systems and designing curriculum and lessons which allow all pupils to achieve.

We provide professional development for all staff that focuses on subject and pedagogical knowledge. Professional development is ongoing and is delivered in school through INSETs, staff meetings, team planning and team teaching. The NCETM Professional Development materials are also used to help develop teacher subject knowledge and enable teachers to deliver teaching for mastery with confidence.

Teaching and Learning Non-negotiables

1. At the start of each Maths lesson **pupils take 3 to 4 minutes to correct errors and respond to their developmental comments** (in purple pen).
2. **Differentiation** must be evident in every lesson to help pupils access learning as independently as possible via layered tasks, outcomes, resources, questioning, student groupings, support and responses, including challenge.
3. **All adults, including LSAs, must actively participate during lessons** to promote rapid pupil achievement. These highly focused, first-rate interventions support immediate improvement and deepen learning for all pupils.
4. **Questioning is effective and challenging** and high-quality responses (full sentences) are expected and modelled with accurate use of mathematical vocabulary. It must consolidate, steer, support, challenge, deepen and extend learning for all pupils.
5. All adults and pupils work with an ethos of celebration, reflection, and improvement to **correct misconceptions effectively and efficiently**.
6. **Teachers must employ a range of effective strategies that promote engagement and participation** with a positive impact on behaviour for learning and pupil achievement.
7. **Subject knowledge must be exemplary, continuously developed and evaluated** over time to create an inspiring and engaging curriculum that promotes learning and curiosity, both within the classroom and beyond.
8. **Opportunities must be provided for pupil discussion as a valuable tool for learning** including **language development skills**. Talk must be meaningful and highly focused on improved achievement.
9. **Planning should exhibit the high expectations of the teacher (including mastery and depth)** and provide sufficient challenge and engagement to support rapid progress in all areas of the subject. **Resources must facilitate high levels of learning** and be fit for purpose. They should model exemplary practice across the curriculum. Text for displays and on Smartboards/PowerPoints should be appropriately sized.
10. **Working Walls must act as a powerful tool for learning**. It must show the learning process including, strategies, pupil suggestions, good examples, key learning concepts, Star Words (key vocabulary), resources made during lessons e.g. success criteria, modelled examples etc. They can act as a helpful document of the learning journey and directly support independent learning.

Further detailed guidance for supporting pupils' development of mathematical knowledge and understanding can be found in **CPA's Maths Guidance** document.