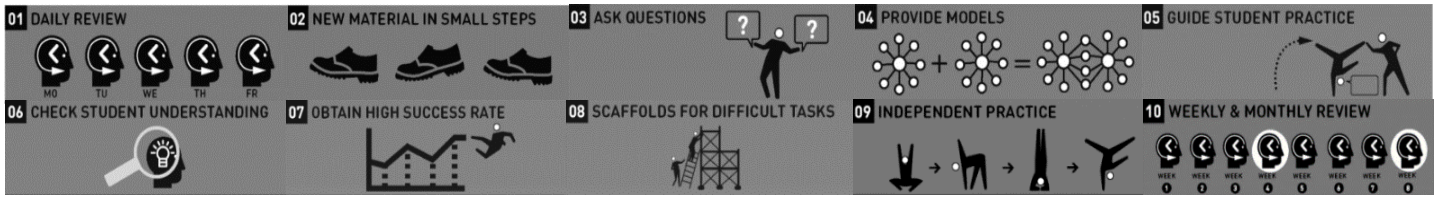
Mount Street Academy
Infant School and Nursery

Mathematics Quality of Education (QED)



Rationale

When teaching Mathematics at Mount Street Academy, we intend to provide a curriculum which caters for the needs of all individual children and sets them up with the necessary skills and knowledge for them to become successful in their future adventures. We endeavour to develop each pupil individually and personally, to promote enthusiasm and enjoyment of mathematics itself, and in doing so help children to appreciate the part mathematics has played in the development of science, technology and our civilisation and the contribution made by many cultures to the progression and application of mathematics. We aim to prepare them for a successful education once they leave us and for a subsequent successful working life. We incorporate sustained levels of challenge through varied and high-quality activities with a focus on fluency, reasoning and problem solving. We seek to foster the development of problem-solving skills through the processes of inquiry and discovery. Pupils are required to explore maths in depth, using mathematical vocabulary to reason and explain their workings. At Mount Street Academy we use Numicon as the consistent resource for introducing and exploring all new concepts in Mathematics and then move on to a wide range of mathematical resources to embed and apply the knowledge, skills and understanding of this concept. Children are taught to explain and show their workings using a progression through the enactive, iconic and symbolic (Bruner 1966) approach; referred to in more recent years by the NCETM as concrete, pictorial and abstract. This ensures that they gain intellectual development and deep understanding of Mathematics, as opposed to rote memorisation of facts. They are taught to explain their choice of methods and develop their mathematical reasoning skills. Our Curriculum Drivers underpin all that we do in Mathematics, and we particularly encourage determination through resilience and acceptance that facing difficulties and challenges in mathematics is often a necessary step in learning. Our curriculum allows children to better make sense of the world around them relating the pattern between Mathematics and everyday life.

Progression

In line with our curriculum design across MSA, our maths curriculum is diligently sequenced to ensure knowledge gained is cumulative. This aids progression as well as frequently allowing children to draw on previously acquired knowledge through retrieval strategies. Concepts are sequenced so that established ideas can be linked to new learning, supporting pupils in developing mastery by understanding the coherent and connected nature of the subject. Maths lessons are carefully sequenced to allow for progression across the lessons. Children first learn a new mathematical concept through concrete (enactive) materials, when this is understood they move on to a pictorial (iconic) representation, and eventually extend their understanding to include abstract (symbolic) forms. Children progress from using basic concrete resources such as Numicon to more complex concrete resources. Representing ideas in different forms helps to deepen their understanding and enable them to apply ideas and skills in different contexts and this positively impacts upon children's progress.

By the end of Key Stage 1, a Mount Street Academy Mathematician will be able to…

Demonstrate confidence and mental fluency with whole numbers, counting and place value

Work confidently with the four operations: addition, subtraction multiplication and division

Work with numerals and words, know number bonds to 20

Recognise, draw, compare and sort different shapes and use the related vocabulary

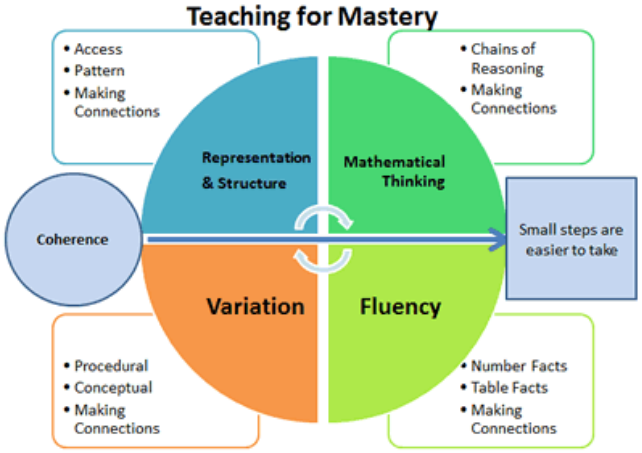
Use a range of measures to describe different quantities such as length, mass, capacity, volume, time and money

Read and spell mathematical vocabulary at a level consistent with their word reading and spelling in English

Intent

The National Curriculum for Mathematics intends to ensure that all children:

1. 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
2. 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
3. Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language



Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into compartmentalised/distinct concepts, but once children have a strong grasp of these concepts, they will then make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They will also apply their mathematical knowledge to science and other subjects. The expectation is that the majority of children 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 children's understanding and their readiness to progress to the next stage. Children 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.

The teaching of fluency	The teaching of problem solving	The teaching of mathematical thinking and reasoning	A vocabulary rich environment
We intend for all children to become fluent in the fundamentals of mathematics, through varied and frequent practice with increasingly complex problems over time, so that they develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.	We intend for all children to 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 intend for all children to reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language	We intend to create a vocabulary rich environment, where talk for maths is a key learning tool for all pupils. Pre-teaching key vocabulary underpins understanding and develops the confidence of children to explain mathematically.

Our approach to teaching Mathematics, as outlined above, also works in line with these 'Teaching for Mastery' principles which seek for a children to develop deep understanding of maths rather than being able to memorise key procedures or resort to rote learning.
Mastery of a mathematical concept means a child can use their knowledge of the concept to solve unfamiliar word problems, and undertake complex reasoning, using the appropriate mathematical vocabulary.

Implementation

At Mount Street Academy we implement our approach through high quality teaching that provides appropriately challenging work for all individuals. We ensure that we:

- Dedicate time for children to learn mathematics and integrate mathematics through the day
- Use manipulatives and representations to develop understanding
- Ensure that teaching builds on what children already know
- Use high quality targeted support to help all children learn mathematics

(EEF – Improving Mathematics in the Early years and Key Stage 1 – Guidance Report: Jan 2020)

Manipulatives are a vital aspect and a powerful tool for supporting children in engaging with mathematical ideas and concepts and help children learn by allowing them to move from concrete experiences to abstract reasoning. At Mount Street Academy we follow a whole-school Numicon based approach to the teaching of new concepts mathematics from Nursery to Year Two. Numicon is a high quality and research proven mathematical resource based on Bruner's enactive, iconic, symbolic approach (also referred to by the NCETM as concrete-pictorial-abstract). This approach encourages seeing connections between numbers and allows children to explore maths using structured imagery and apparatus in order to understand and explain mathematical concepts and acquire, use and apply mathematical language. Numicon is inclusive, progressive and supports children in understanding number relationships, calculating without the need for constant counting all, as well as developing mathematical language and supports children in making connections and using and applying their understanding. Numicon encourages high levels of discussion which is a vital aspect of mathematical learning. Once these concepts have been grasped with Numicon, the children then move on to a wider range of mathematical resources, such as cubes, counters, base ten etc. to embed and apply the knowledge, skills and understanding of this concept further. This ensures that children understand the links between the manipulatives and the mathematical ideas they represent. Once children have explored and grasped the mathematical concept at the enactive (concrete) stage they can then move to applying this to iconic (pictorial) representations, through both provided images and through encouragement to represent their mathematics in their own way through drawings and marks.

Delivery EYFS

In Nursery and Reception we follow the NCETM Early Years Materials – we focus on the Six Areas of Early Mathematical Learning: Cardinality and Counting; Comparison; Composition; Pattern; Shape and Space and Measures along with the NCETM Numberblocks support materials.

In Nursery time is dedicated to mathematics through gather times as key worker groups as well as through indoor and outdoor provision opportunities. Provision opportunities allows children to revisit concepts and skills modelled and guided in gather times, in different contexts such as stories, puzzles, songs, rhymes and games.

In Reception, dedicated time to focus on mathematics is provided through daily mathematics adult led whole class sessions. This comprises of a five-minute whole class focused daily counting session as well as a ten-minute session where a concept or skill in Mathematics is explored as a 'my turn/our turn' approach with the adult modelling, guiding and scaffolding the learning. Individual children/groups of children then have opportunity to acquire, apply and deepen this learning with adult support within provision time focused specifically on their next steps.

In both Nursery and Reception there is further opportunity to make the most of using mathematics in moments through the day such as welcome times, daily routines, songs, rhymes and stories where mathematical vocabulary and skills are reinforced and opportunities for further discussion and application of mathematical ideas with the children are provided.

Delivery Key Stage One:

In Key Stage One we use a range of planning resources, including White Rose Hubs, NCETM and NRICH. Daily focused maths lessons comprise of a 'my turn/our turn' whole class/half the class approach with the adult using this time to guide the learning within the children's Zone of Proximal Development (Vygotsky) and to explore new concepts/skills. Following this adult guided input, the children then access 'your turn' independent learning (pitched within their 'current abilities' (Vygotsky) for the skills progression for that concept and/or they continue to work with an adult to continue to be challenged within their ZPD within that concept. Children are

taught through clear modelling, guidance and scaffolding and have opportunity to develop their knowledge and understanding of mathematical concepts. The mastery approach incorporates using objects, pictures, words and numerals (enactive-iconic-symbolic) to help children explore and demonstrate mathematical ideas, enrich their learning experience and deepen understanding at all levels. Children work on the objective at whatever entrance stage they are assessed as being at. During each lesson children have opportunity to acquire the skill, apply the skill or deepen the skill. Staff use 'within the lesson' as well as 'day to day' assessments to inform groupings of children for each lesson and to note where children require further support/to move to the next step in their learning.

At the start of each new concept, key vocabulary is introduced and revisited regularly to develop language acquisition, this is then embedded as the concept progresses. All lessons include opportunity to recall previous learning and opportunity for retrieval practice in order to develop long-term memory. Working memory and retrieval are further supported through the use of maths working walls in each KS1 classroom. These working walls act as an external tool to visually remind and prompt children of key steps, language, approaches and examples of the concept they are learning.

Mathematics lessons are focused on supporting children in achieving their next steps and lessons are delivered using effective approaches: daily review, new material in small steps, questioning, providing models, guided student practice, checking for understanding, scaffolding tasks and independent practice (Ten Principles for Effective Teaching – Rosenshine). This is delivered as mixed ability whole class lessons and/or targeted small group focused sessions, dependent upon the teacher's day to day assessments of the needs of the children as they move through learning a concept. We use a 'my turn, our turn, your turn' lesson model in order to structure daily lessons and learning across the week. This is based on Vygotsky's Zone of Proximal Development (ZPD)and supports accelerated progress by ensuring that children working independently are working within their current learning/abilities applying and embedding skills they have a secure grasp of, independently. This revise and review approach ensures that children have opportunity to revisit previous learning and ensures that maths skills are embedded. Where they are working within their ZPD, they work alongside an adult who models, scaffolds, challenges, supports, probes and questions the children to support them in securing this concept/skill/understanding. This approach to teaching and learning enables teachers to observe and listen carefully to children's responses to access what they do and do not know, in order to extend learning for all children at every opportunity. Teachers use a variety of methods to assess children's understanding, in a variety of contexts. They look for children who are able to articulate their reasoning and approach to achieving their answers as a sign that they have grasped a concept and are ready move on to their next step in learning.

Weekly planning is structured across year groups where the progression in a skill/concept is mapped out and activities that will allow children to move through that progression are planned. Class teachers are then able to group their children according to their next steps. When learning a new concept, the children always start at the enactive (concrete) stage working practically with Numicon. They then move onto the iconic (pictorial) stage with printed images to support their recall of the enactive stage of learning and then move to the symbolic (abstract) stage where the children can use mental recall to refer back to their hands-on experience and visual (iconic/pictorial) image to support them at this stage. This approach supports and guides children through their understanding of mathematical processes and ensures maximum opportunity for progress for all children.

For those children who continue to struggle with mathematical concept and are not making progress within Quality First teaching, there is support through intervention as an individual or as part of a small group with a common need. These sessions are delivered by teachers or teaching assistants following the direction of the class teacher as a short burst catch up, or through a set evidence-based programme by a trained teaching assistant and the impact of this is reviewed termly by the SENDCo.

<u>Assessment:</u>

Through our teaching we continuously monitor children's progress against the expected attainment for their age; making formative assessment notes where appropriate and using these to inform our planning day to day teaching. Discussions in termly Pupil Progress Meetings and our summative school tracker, Target Tracker also supports the assessment and monitoring of children's progress. The main purpose of all assessment is to always ensure that we are providing excellent provision for every child.

Impact

We expect that when we have implemented all of the above, by the time the children leave us in Year Two they will:

- demonstrate a quick recall of facts and procedures, underpinned with deep understanding of the concepts.
- show confidence and believe that they will and can achieve in mathematics.
- have achieved the objectives (expected standard) for each year group.
- have the flexibility and fluidity to move between different contexts and representations of maths.
- have had the chance to develop the ability to recognise relationships and make connections in maths lessons.
- have mastered mathematical concepts or skills; showing it in multiple ways, using the mathematical language to explain their ideas, and independently applying the concept to new problems in unfamiliar situations.
- show a high level of pride in the presentation and understanding of their work

Assessment and Feedback:

- Assessment informs the teaching and learning sequence, and children work on the objectives assessed as their next steps
- Feedback is given on children's learning in line with our feedback policy
- Formative assessment within every lesson helps teachers to identify the children who need more support to achieve the intended outcome, and who are ready for the next step
- Summative assessments are completed at the end of each large term and data inputted onto our school data tracking system, Target Tracker, as well as at the end of the academic year and reported to parents in the end of year report.

The Maths Subject Leader has a clear role and overall responsibility for the progress of all children in mathematics throughout school. Regular book looks, learning walks, planning scrutiny and child interviews provide the overall picture of Mathematics across school and supports the monitoring and evaluation of the intent and implementation outlined above, allowing for exploration and challenge. The key focus for this is to seek:

PUPIL VOICE	EVIDENCE IN KNOWLEDGE	EVIDENCE IN SKILLS	BREADTH AND DEPTH
Through discussion and feedback, children talk enthusiastically about their maths lessons and speak about how they love learning about maths. They can articulate the context in which maths is being taught and relate this to real life purposes.	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.	Pupils use acquired vocabulary in maths lessons. They have the skills to use methods independently and show resilience when tackling problems.	Teachers plan a range of opportunities to use maths inside and outside school.

Key data drops are also analysed, and regular feedback is provided, to inform on progress and future actions through SEFs. These then provide the basis for the chosen actions which are then outlined on the action plan, in order for this monitoring and evaluation cycle to continue to drive improvement.