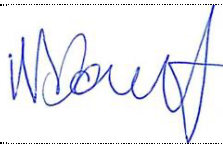




Mathematics Curriculum Policy

November 2024

Signed (Chair of Trustees):	
Date:	November 2024
Date of Review:	November 2025

Arbor Academy Trust reviews this policy annually. The Trustees may, however, review the policy earlier than this, if the Government introduces new regulations, or if the Trust receives recommendations on how the policy might be improved. This document is also available in other formats e.g. e-mail and enlarged print version, on request to the School Offices and is displayed on the schools' websites.

Mathematics Curriculum Policy

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Introduction

Our curriculum aligns and exceeds aspects of the national curriculum. 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.

Aims

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

We want 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 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.

In order to achieve this we:

- provide opportunities to practise and develop skills, knowledge and understanding
- equip pupils to apply mathematics to real life situations as well as understanding the importance of mathematics in everyday life;
- promote enjoyment and enthusiasm for learning by making teaching and learning practical, exploratory and investigative using a wide range of resources to ensure the curriculum is accessible as possible;
- encourage co-operation as well as independence and to promote confidence and competence with numbers and the number system;
- develop children's ability to solve problems through decision-making and reasoning in a range of contexts;
- develop a practical understanding of the ways in which information is gathered and presented;
- explore features of shape and space, and develop measuring skills in a range of contexts; and ensure that every pupil achieves their fullest potential.

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 apparently distinct domains, but pupils should make rich connections across

mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects. 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 should always be 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.

The national curriculum for mathematics reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. They must be assisted in making their thinking clear to themselves as well as others and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study. In addition, schools can introduce key stage content during an earlier key stage, if appropriate. All schools are also required to set out their school curriculum for mathematics on a year-by-year basis and make this information available online.

How we teach Mathematics

We have a Maths mastery teaching timeline and approach, we have daily Maths lessons which are approximately 45 minutes to an hour. Within this we adopt a **four-part structure** of:

- **Quick Maths**, an opportunity for pupils to recap their learning from the previous year, includes **review/recap** general starter, an opportunity for pupils to recap their learning from the current year, ready to build on this learning in the lesson – Based on retrieval research.
Hook (Opportunity for elicitation and exploration)
- Guidance (**Main teaching** where the teacher models examples)
- Independent (Opportunity for pupils to practice examples by themselves and show depth of understanding)
- Reflection (opportunity to review learning and misconceptions and deepen the learning – mini-plenaries, plenaries)

Key learning constructivist theorist including Jerome Bruner emphasised the use of Concrete, Pictorial, Abstract (C P A) approach of teaching maths. CPA is effective as it helps learners to be more secure in their understanding and prove/justify that they fully grasped an idea. Ultimately gives a firm foundation for future learning, particularly SEND, disadvantaged or 20% of the least able pupils. The use of Blooms Taxonomy supports assessment and challenge

pupils within lessons. Research in Learning from key theorists in education (Vygotsky, Piaget and Bruner) is heavily referred to in promoting students' positive attributes to learning. The following are fundamental in ensuring that such key aspects are being delivered daily in the classroom.

- Opportunities for students to interact with their peers (Vygotsky)
- Concrete activities
- Exploration (Piaget)
- Safety of learning environment (Promoting 'productive failure' – learning from mistakes)

We want pupils to become independent mathematical learners who are encouraged to reason and explain their learning. Such skills can be reinforced, embedded and developed further in order to be used and applied in different contexts.

Teaching and learning style

Reflection and thinking skills:

Thinking skills are essential for mathematical problem solving. Thinking skills are skills that can be used in a thinking process such as classifying, comparing, analysing parts and whole identifying patterns and relationships induction, deduction generalising and spatial visualisation. These include using a representation e.g. drawing a diagram, tabulating, making a guess e.g. trial and improvement/guess and check making a supposition, walking through the process e.g. acting it out, working backwards and changing the problem e.g. simplifying the problem, considering special cases.

Learning is about making connections:

- The spiral curriculum (curriculum approach) – connecting to extend existing knowledge and skills
- The Concrete-Pictorial-Abstract (CPA) development of concepts (pedagogical approach) that connect to make sense of learning.

Learning experiences or approach – connections to realise the curriculum

In order for students to make all-important connections that are pivotal to learning, we promote the following in the learning environment:

- Real – world model
- Visual model
- Oral explanation
- Written explanation
- Challenge (enrichment activity)

The Teaching and Learning of Mathematics at our school should be reflective of these key principles and provide daily opportunities for these connections and skills to be taught.

Mental Maths

Why mental mathematics and visualisation?

Mental mathematics is part of any mathematical activity and is the quickest way to raise standards in school. As children become more confident at seeing mathematics and working things out in their heads they become better at problem solving and reasoning as well as calculating or working with shape and measure.

Mental activity needs teaching and practice to develop efficient and effective ways of thinking and organising thoughts and ideas. We need to help children to:

- Carry and manipulate information in their heads.
- Visualise images and to interpret and analyse what they see.
- Select and organise information in a systematic and logical way identifying patterns and applying logical reasoning.

Visualisation

To use visualisation successfully, children need practical experience, along with opportunities to talk about the equipment they are using and the images they are forming in their head. They also need to learn and use the related mathematical language. Visualisation could also involve the children making some notes or jottings to help them. These should not replace the visualisation but provide support when children can no longer hold everything in their minds. Being able to listen to description, interpret the context or task and manipulate the image can be challenging for some children, so making jottings of this kind might be an important step in the development of their visualisation.

Teaching mental maths at our school

The teaching of mental maths should consist of objectives/composites or components taken from curriculum and visualisation activities. Mental maths is taught everyday through: quick maths/five minute fillers which reinforces the fluency of calculations from the previous academic year; and general mental starters linked to the concept you're teaching. Mental maths activities should focus predominately on number.

Practical Learning in mathematics –

Practical learning in mathematics is essential because it helps bring together both abstract and practical everyday learning to mathematical concepts. Practical maths puts learning into a real-life context and makes it relevant. A child's learning and development in mathematics will be deeper and they will become more competent mathematicians.

Practical learning -

The teaching of mathematics should give opportunities for children to develop their mathematics skills through practical activities. Children must have the opportunity to

complete a short practical task followed by time for them to record their findings. Areas of the mathematics curriculum where practical learning is necessary are weight, length, capacity, money and sometimes fractions.

In KS1 practical learning is also needed when the children are beginning to understand multiplication and division. All children should experience some practical learning each term. Practical learning could form the basis of the problem solving lesson weekly. The practical task could be used as a means of solving the problem followed by the children recording what they have found out.

Mathematics curriculum planning

Mathematics is a core subject in the National Curriculum, and we use the following key documents when planning:

- Maths Curriculum
- Maths Overviews
- Shanghai maths
- Maths no problem
- Primary calculation policy
- Test base
- PIXL

The curriculum overview is organised within the four operations of number (Numerical reasoning; Additive reasoning; Multiplicative reasoning and Geometric reasoning). These skills are taught systematically and frequently using the weekly, termly and yearly composite with opportunities to use and apply within varying contexts such as measure and statistics.

Long term planning: is based on the whole School overview in Mathematics.

Medium term planning: are the components and concepts that are set out in the 'Securing Progression in Mathematics' and carefully selected composites. The medium term planning is collected and monitored by the maths co-ordinator and SLT every half term.

Short term planning: is carried out on a weekly basis. All planning includes a skill-based learning objective with succinct success criteria, a quick maths starter, a general starter, a guided practice activity, a progressive teaching sequence, key AFL strategies, key questioning, relevant vocabulary and resources.

Short term planning is collected weekly and monitored by the maths subject leader and SLT.

The class teacher keeps the weekly planning visible in the classroom and then is expected to highlight which targets are met or exceeded in order to inform the next week's planning. Each class teacher and teaching assistant then discusses the planning on a weekly basis.

Teachers should have high expectations of their pupils and must ensure that work is appropriately challenging and engaging. Teachers should make explicit to the pupils the

objectives, success criteria and expectations for the lesson which must be displayed on the board and referred to before any lesson commences.

The Foundation Stage

We teach mathematics in our reception class and nursery. As the class is part of the Foundation Stage of the National Curriculum, we relate the mathematical aspects of the children's work to the objectives set out in the Early Learning Goals, which underpin the curriculum planning for children aged three to five. We give all the children ample opportunity to develop their understanding of number, measurement, pattern, shape and space through varied activities that allow them to enjoy, explore, practise and talk confidently about mathematics.

Teaching Mathematics to children with special educational needs

We teach mathematics to all children, whatever their ability. Mathematics forms part of the school curriculum policy to provide a broad and balanced education to all children. Through our mathematics teaching we provide learning opportunities that enable all pupils to make progress. We do this by setting suitable learning targets and responding to **each child's different needs in consultation with the Inclusion Manager**. The SEND Code of Practice demands that children with SEND are entitled to reasonable adjustments and access to the curriculum. So, we teach Mathematics to all children considering how they learn best and how they can access the concept. Teachers use data and knowledge of each child to vary the resources and make adjustments that ensure the children access the mathematics curriculum.

Assessment against the National Curriculum *allows us to consider each child's attainment and progress against expected levels*. If a child's needs are particularly severe they will work on an individualised programme written in consultation with the appropriate staff. Teaching styles should be interactive allowing for pupil participation. **A combination of open and closed questioning should also be used by teachers** which allow all pupils to participate in the lessons. When planning, teachers will try to address the child's needs through simplified or modified tasks or the use of support staff. We look at individual children and determine that when progress falls significantly outside the expected range, the child may have special educational needs. Our assessment process looks at a range of factors classroom organisation, teaching materials, teaching style and variation so that we can take some additional or different action to enable the child to learn more effectively. This ensures that our teaching is matched to the child's needs. Intervention through SEN Support and EHC plans will lead to the creation of an Individual Education Plan (IEP) for children with special educational needs. The IEP may include, as appropriate, specific targets relating to art. We enable pupils to have access to the full range of activities involved in learning art. Where children are to participate in activities outside the classroom, for example, a visit to an art gallery, we carry out a risk assessment prior to the activity, to ensure that the activity is safe and appropriate for all pupils.

Assessment and recording

As soon as pupils are inducted into the school, we carry out on-entry baseline assessment. Progress in Understanding Mathematics Assessment (NEFER) tests the pupil's mathematical knowledge not their reading, writing or spelling ability. It provides the school with diagnostic information as well as a standardised score. NEFER assessments are carried out with the whole class at the end of each term. Alongside this pupils may sit a SAT's style test which enables us to monitor progress every half term.

There is on-going informal assessment carried out by the teachers every day which informs our weekly planning. These results are then tracked onto Sims where the progress, strengths and weaknesses can be tracked and are informative for the next half term/term/academic year.

For each attainment area **every pupil is given between 1 and 4 targets which relate directly to the National Curriculum**. Every half term these targets are then reviewed to see if they have been met through both informal and formal assessment to see whether the target is appropriate and/or whether the pupils still need to consolidate the target(s).

- All data is analysed by senior management, the mathematics coordinator and the **Inclusion team**.
- All parents receive an annual written report in spring on which there is a summary of their child's effort and progress in mathematics over the year. In addition to this, parents will also receive a termly report card which provides information on the child's current level, the progress grade and the effort grade.
- At the end of Key Stage 1 and Key Stage 2 each pupil's level of achievement against national standards is included as part of their written report.

Resources

Equipping and resourcing lessons maths lessons underpin our expectation for supporting all children. The skills, experience and knowledge of all staff are valued and all contribute within the school. There is a range of resources to support the teaching of mathematics across the school. All classrooms have the basic resources and equipment within their classroom. Any extra resources needed are accessible to the entire school in the maths resources room which is used as the central storage area. A range of software is available to support work with the computers.

Monitoring and review

Monitoring of the standards of children's work and of the quality of teaching in mathematics is the responsibility of the mathematics subject leader and SLT. The work of the mathematics subject leader also involves supporting colleagues in the teaching of mathematics, being informed about current developments in the subject, and providing a strategic lead and direction for the subject in the school. The mathematics subject leader gives the head teacher a termly report in which s/he evaluates strengths and weaknesses in the subject and indicates areas for further improvement. The head teacher or Head of School allocates regular

management time to the mathematics subject leader so that they can review samples of children's work and undertake lesson observations of mathematics teaching across the school. A named member of the school's governing board is briefed to oversee the developments of mathematics. This governor meets regularly with the subject leader to review progress.

Subject	Term	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Mathematics	Autumn	Develop fluency of whole numbers, know place value, properties of shapes and describe and compare quantities	Solve one step addition and subtraction problems involving number bonds and partitioning	Use efficient written and mental methods for the four operations	Develop efficient methods to calculate accurately including decimals	Use four operations confidently to solve fractions, decimals and percentages problems and analysis 2D and 3D shapes accurately	Be fluent with all four operations, including long multiplication and division, and in fractions, decimals and percentages using correct mathematical language
	Spring	Use knowledge of addition and subtraction to solve single step problems involving time, measure, weight and shape	Recall multiplication and division facts and apply when solving word problems.	Use number facts and concepts of place value to calculate accurately	Estimate, compare and calculate different measures including money in pounds and pence	Use a range of efficient methods to solve written and mental calculations including geometry and measurement	Develop connections between multiplication and division with fractions, decimals, percentages and ratio and classify shapes with increasing complex geometric properties
	Summer	Solve one step word problems including missing quantities in number sentences and explain reasoning	Apply knowledge of all four operations to solve a range of mathematical problems	Use efficient methods to solve problems and explain why a particular operation is most appropriate	Solve a range of problems including fractions, time, measure and money	Solve multi-step problems including whole numbers, decimals, percentages, fractions and measures	Reason mathematically, follow a line of enquiry and solve a range of routine and non-problems