

Mathematics Curriculum Purpose and Rationale

At Arden Forest our vision is to enable our whole school community with the skills to be happy, successful and independent life-long learners with healthy mind, bodies and spirit.

'Little Learners, Big Achievers'



Taken from Arden Forest vision statement and school motto.

Statutory Commitment

EYFS Framework (Sept 2021)

Educational Programmes – Mathematics

Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built.

In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures.

It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.

KS1 National Curriculum (2014)

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 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 no routine problems with increasing sophistication,

including breaking down problems into a series of simpler steps and persevering in seeking solutions.

School Commitment

Our Curriculum Intent (Appendix A) identifies what opportunities and experiences our pupils have on entering our school. This also recognises what our pupils need in order that we fully enable our school vision. It maintains a fidelity to the new EYFS Statutory Framework and KS1 national Curriculum as well as a commitment to alignment across the two phases in our school.

Through our Mathematics curriculum, we intend for all our children to become masters in mathematics. Our children will embark on a learning journey taught and delivered through a mastery approach which is inclusive, creative and engaging, maximising the development of the mathematical language, and providing the knowledge and skills needed for the next steps of their education. We want to develop the children's problem solving skills so that they can articulate their reasoning about numbers, fractions, patterns, measures, geometry and statistics. The ability to develop rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems will help pupils become well rounded mathematicians. To ensure this, there is an emphasis that our Mathematics curriculum chooses high quality physical and practical concrete resources and pictorial representations and models for children to use and access at any time, which will support the development of all mathematical skills and language that they need.

Our Growth Mindset Learning Behaviours help children develop the right attitudes to Mathematics in order that they fulfil their potential and experience success. E.g. valuing the need to be a stick-a-saurus and keep persevering when faced with challenges in a contextual multiplication problem, or a think-a-docus when considering different methods and strategies to reach an answer, a team-rex to collaboratively work with others to reach a goal, and especially a Solv-a-tops to solve mathematical problems. Within all aspects of Mathematics, there are opportunities for pupils to develop their School Responsibilities' of being kind and respectful, learn and let others learn and keeping themselves and others safe.

Why do learners at Arden Forest Infant School need to study Mathematics?

At Arden Forest Infant School, our teaching of Mathematics supports our vision of inclusive practice and it enables all children to achieve their potential. We believe that Mathematics lessons will engage, inspire and challenge all children to learn and master a range of strategies to solve numerical and contextual problems in a positive way.

"A mathematical concept or skill has been mastered when, through exploration, clarification, practice and application over time, a person can represent it in multiple ways, has the mathematical language to be able to communicate related ideas, and can think mathematically with the concept so that they can independently apply it to a totally new problem in an unfamiliar situation."

- Mastering Mathematics: Teaching to transform achievement (2014)

Therefore during our Mathematics lessons, the children will have access to a wide range of high quality concrete resources and pictorial images and representations, alongside key mathematical vocabulary and language. This will develop their independence and perseverance in choosing a range of effective strategies to solve questions and problems, where they can use these manipulatives and draw jottings to help reach a mathematical solution.

How we promote personal characteristics and relationships?

At Arden Forest Infant School, the Mathematics curriculum delivers a range of social, moral, spiritual and cultural aspects which reflects the school's Personal Characteristics and Relationships principles. It encourages the children to be responsible, show kindness, respect, positivity, tolerance and resilience. All of these themes are woven through our wider curriculum, but are also echoed in Mathematics by creating resilient learners who are keen to solve problems and articulate their thinking. It encourages kindness and respect for one another as well as our relationships with others, as the children listen to other's strategies and how they reach their answer. It also includes tolerance, as children are freely encouraged to agree or disagree with a strategy or an answer, whilst showing mutual respect. Within Mathematics children will often have opportunities to work systematically, sharing concrete resources and managing their own tasks. Children are encouraged to support each other positively and respectfully through working with a 'talk partner' which are changed regularly. This demonstrates respect and kindness for each other and each other's contributions. Children are able to develop their self-esteem, self-knowledge and self-confidence to share their ideas and to justify and prove their answers. Together, children will experience challenge safely and understand that they can be resilient in all of their learning.

What are the aims for the Mathematics Curriculum?

Mathematics is essential for everyday life and understanding our world. Our aim is to engage, inspire and challenge children, by enabling the development of pupils' natural ability to think logically and solve puzzles and real life problems. Pupils learn to think creatively and make links between mathematical concepts through exploring patterns in the number system, shape, measures and statistics. They make and discuss propositions, explaining their reasoning and justifying their answers. They develop the skills, knowledge and efficient methods of calculation necessary to support their economic future and problem solving in life.

Children will learn to recall a range of number facts to develop their fluency and so they can apply this in a range of situations starting from Reception and building on these throughout their journey at Arden Forest. Children will learn to subitise amounts and become familiar with numerals and their value. Number formation skills are taught progressively, ensuring that fine motor skills are developed. Initially there is a focus on correct number formation before developing the skills of legibility, fluency and speed overtime. Children will be encouraged to spot patterns when counting and identifying odd and even numbers and will be able to compare amounts in a range of contexts. They will become competent in recalling number bonds to 5, 10, 20 and 100, as well as in a range of addition and

subtraction facts. Children will learn the relationships between numbers such as $10 + 2 = 12$ so $12 - 2 = 10$, and will start to develop times table knowledge for 2's 5's and 10's. Children will also develop their fluency for halving and doubling numbers and amounts. The children will develop their knowledge and skills on measures, including how to measure length, height, weight and time. These will continually be referenced through practical activities in other subjects such as Design and Technology, Science and Physical Education. Therefore, developing their knowledge and skills over time. Our children will explore and handle money, using this resource to solve problems including making amounts and giving change. Through practical activities such as setting up a shop and selling items at a charity event, children will be able to apply their fluency skills and number facts through collaborative learning.

Not only does spoken language underpin the development of reading and writing, it helps develop their reasoning and explanations of their methods and strategies in mathematics. Therefore we ensure the continual development of pupils' confidence and competence in spoken language and listening skills. This includes growing the children's confidence in engaging in extended conversations and articulating their ideas by modelling sustained talk such as, "If I know this... I also know this". Children will experience high quality discussion and will be encouraged to 'explain how they know' by proving their strategy and answer and to 'agree' or 'disagree' with other children and explain why. They will be encouraged to explain 'what they notice' about a problem or a puzzle, as this will give them the opportunity to think deeply and logically.

In order to achieve these aims, the Mathematics curriculum at Arden Forest, provides lots of first hand and real-life experiences to make learning relevant and purposeful. The children will be asked questions at the beginning and end of each lesson to check they are knowing and remembering more. In Mathematics lessons the children are given the opportunity to be reflective about their methods, thinking about how they can make changes and work more fluently and efficiently. We encourage the children to take risks, experiment and reflect on their learning to develop children's perseverance and resilience in Mathematics through high quality interactions with their peers and with the Teachers.

How does Mathematics help our pupils to be aspirational lifelong learners?

We use maths every single day throughout our entire lives, so having a good Mathematical understanding, including the ability to reason and problem solve efficiently, will provide direct links to future employment. These opportunities will mean that our children will contribute to community and wider society, this might include becoming a fighter pilot, careers in business management, architecture, games designing or programming, accountancy, engineering and even in astronomy!

Why has the specific knowledge been selected?

At Arden Forest Infant School, the Mathematics curriculum is taught discreetly, with other subject areas using and applying the skills taught in Mathematics in context. It is designed to help our children know and remember more. Each year, they will increase their

knowledge and understanding with number as they work within and solve calculations with higher numbers and apply these within areas such as measures and money. They will also develop their fluency skills by learning instant recall of increasing number facts and bonds from Reception to Year Two. The children will also know more mathematical vocabulary so they are able to articulate their reasoning in discussions, such as when exploring properties for shapes and measures. This provides breadth and develops greater understanding of all the key areas of mathematics, which is systematically built up over time. Children will gain a secure understanding of the four operations (addition, subtraction, multiplication and division) and will be equipped with a range of strategies to solve these calculations in concrete, pictorial and abstract form, to help develop the necessary knowledge and skills in readiness for KS2.

How is Mathematics implemented?

As we use mathematics all the time, it is important that the children are immersed in this so that they develop those rich connections to help them think, use a strategy and solve problems. Children will enjoy discrete daily mathematic lessons from start of reception until end of Year Two and these will be delivered in the classroom, the school outdoor environment and in wider localities over time. By following a spiral curriculum, our pupils are able to revisit a topic, theme or subject several times throughout their school journey. The complexity of the topic or theme increases with each revisit but new learning has a relationship with old learning and is put in context. We believe the benefits of teaching in this way are that the information is reinforced and solidified each time the pupil revisits the subject matter as it allows a logical progression from simplistic ideas to complicated ideas.

Problem solving is at the heart of all mathematical learning and teaching. Every learning journey begins with a rich problem that is unpicked by the pupils. They identify what skills they will need to develop to be able to solve the problem and these are explored throughout. These skills are then developed throughout a series of following lessons using a concrete-pictorial-abstract approach. They will be taught a range of methods and strategies, whilst learning important mathematical vocabulary to use whilst they are encouraged to explain their thinking and their processes throughout through key questioning from the Teachers. Throughout the learning journey, the children have the opportunity to develop fluency facts and solve a range problems that require these skills. By constructing the learning journey in this way, the pupils are given the opportunity to see how mathematical skills can be applied to real life problems, therefore giving it a context.

What is the impact?

The impact of our Mathematics curriculum can be seen not only in our children's Mathematics books but also through classroom working wall displays, our pupils' conversations and within the school environment. Close monitoring of Mathematics ensures that standards and expectations in teaching and learning remain high. The children's outcomes in Mathematics are also evident in the data which is in line with National statistics and above for children working at Greater Depth. This data enables us to reflect on the intent of the Mathematics curriculum and how it is being implemented, eg are our children fluent in number facts, how can we

improve this? Regular analysis of pupil attainment and progress data also ensure outcomes from starting points follow an expected trajectory against the termly milestones as well as identify specific groups or individuals in need. This ensures children are on track during the year. Interventions provide opportunities for specific children to 'close the gap' and address any misconceptions. Our children are given a broad range of daily experiences in Mathematics with many chances for practice and application. Our children are able to use Mathematics in everyday situations and in real life contexts.

Appendices:

A. Overall School Curriculum Intent

B. Mathematics aims/end points of specific stages of curriculum

- EYFS Framework (ELGs) and National Curriculum
- See Progression in Learning Framework for Mathematics which overarching maps that show the sequence and progression in learning from the beginning of Preschool Year until the end of Year Two.



Appendix A

Arden Forest Infant School – Curriculum Intent

What do we know about our community of learners? What opportunities/experiences have they had already and what have they not yet benefited from?

Our pupils start Reception from a large number of different pre-school settings. They have a diverse range of cultural and family backgrounds which are valued and shape our unique relationships with our school community.

Communication skills vary on entry, children are often reluctant to engage in extended conversations or articulate their thinking. Children often need support to identify and moderate their own feelings and are not able to solve minor disagreements.

We have an increasing percentage of children with additional needs compared to the national average, including those with ASD. As such, communication and language, physical development and personal and social and emotional development is significantly lower for these children. Recently, many children have not been able to access outside agency support due to COVID restrictions.

When our children begin Reception, they are often confident, show curiosity and are eager to explore their environment. However, our pupils' often lack sustained thinking and focus. Children are reluctant to be independent in their learning and life skills, and often their resilience and perseverance in the face of challenge is low which is a barrier to success. They lack experience of opportunities to take calculated risks.

Children typically have good access to outdoor spaces which enable a knowledge of the natural world around and gross motor skills to be typically at age related expectations. However, children's fine motor skills are typically not as developed.

Children generally access books and stories at home. However, the ability to blend and segment in phonics is a barrier for most children which impacts on their reading and writing on entry. Most parents generally take an active role as partners in their children's learning.

The majority of children show everyday application of skills in mathematics. Children usually have access to technology at home. Imagination is often good in small world and role play but children lack creativity and skill with music, art and design. We have observed that our children tend to have a limited cultural experiences of the arts or awareness of their wider community.

In September 2021, some children starting with us will have lived nearly half of their life with the pandemic.

Our Year One children spent a third of their Reception Year Learning remotely and missed a significant part of the experience due to lockdown. Our Year Two children spent a third of their time in Year One being taught remotely a significant part of their Reception Year due to lockdown.



Appendix B

Mathematics aims/end points of specific stages of curriculum

EYFS Framework (September 2021)

ELG: Number

Children at the expected level of development will:

- Have a deep understanding of numbers to 10, including the composition of each number
- Subitise (recognise quantities without counting) up to 5;
- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

ELG: Numerical Patterns

Children at the expected level of development will:

- Verbally count beyond 20, recognising the pattern of the counting system;
 - Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity;
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

Mathematics STA Teacher Assessment Framework at end KS1

Working at the expected standard:

The pupil can:

- read scales* in divisions of ones, twos, fives and tens
- partition any two-digit number into different combinations of tens and ones, explaining their thinking verbally, in pictures or using apparatus
- add and subtract any 2 two-digit numbers using an efficient strategy, explaining their method verbally, in pictures or using apparatus (e.g. $48 + 35$; $72 - 17$)

- recall all number bonds to and within 10 and use these to reason with and calculate bonds to and within 20, recognising other associated additive relationships (e.g. If $7 + 3 = 10$, then $17 + 3 = 20$; if $7 - 3 = 4$, then $17 - 3 = 14$; leading to if $14 + 3 = 17$, then $3 + 14 = 17$, $17 - 14 = 3$ and $17 - 3 = 14$)
- recall multiplication and division facts for 2, 5 and 10 and use them to solve simple problems, demonstrating an understanding of commutativity as necessary
- identify $1/4$, $1/3$, $1/2$, $2/4$, $3/4$, of a number or shape, and know that all parts must be equal parts of the whole
- use different coins to make the same amount
- read the time on a clock to the nearest 15 minutes
- name and describe properties of 2-D and 3-D shapes, including number of sides, vertices, edges, faces and lines of symmetry.

1 For example, base 10 apparatus.

2 Key number bonds to 10 are: $0+10$, $1 + 9$, $2 + 8$, $3 + 7$, $4 + 6$, $5 + 5$.

* The scale can be in the form of a number line or a practical measuring situation.

Working at greater depth within the expected standard:

The pupil can:

- read scales* where not all numbers on the scale are given and estimate points in between
- recall and use multiplication and division facts for 2, 5 and 10 and make deductions outside known multiplication facts
- use reasoning about numbers and relationships to solve more complex problems and explain their thinking (e.g. $29 + 17 = 15 + 4 + \square$; 'together Jack and Sam have £14. Jack has £2 more than Sam. How much money does Sam have?' etc.)
- solve unfamiliar word problems that involve more than one step (e.g. 'which has the most biscuits, 4 packets of biscuits with 5 in each packet or 3 packets of biscuits with 10 in each packet?')
- read the time on a clock to the nearest 5 minutes
- describe similarities and differences of 2-D and 3-D shapes, using their properties (e.g. that two different 2-D shapes both have only one line of symmetry; that a cube and a cuboid have the same number of edges, faces and vertices, but different dimensions).