Ark Blake Academy

Subject Curriculum Intent: Maths

Definition of Subject

"The laws of nature are written in the language of mathematics." This powerful statement from the father of modern science, Galileo, depicts the overwhelming importance of mathematics. It is truly the universal human language that has stood the test of time. It provides us with a compact and structured way of reasoning and presenting our arguments. It is fundamentally a means of searching for truth and meaning in our lives. We are taught to think critically about the world, to question our assumptions, and to illustrate the power of logical deduction.

Nature of Subject

Knowledge of mathematics in a secondary setting is split into the following categories: Number; Algebra; Ratio and Proportion; Geometry and Measures; and Probability. Each category provides pupils with the opportunity to learn how mathematics can be applied in different contexts yet understand the links that connect these seemingly separate topics.

In working mathematically, pupils are expected to demonstrate their understanding in different manners. At the most fundamental level, pupils will develop fluency of the essential operations, procedures and skills. This then moves on to the ability to reason mathematically – that is to make connections between different aspects of knowledge and understand how they are related. At the most challenging end, pupils will be confronted with problem-solving that requires knowledge from different areas of mathematics. These three key skills of fluency, reasoning and problem solving will be intertwined throughout the mathematics curriculum.

Purpose of Subject

There are several reasons for studying mathematics. At its core, it will empower pupils to make decisions based on information as opposed to hearsay. It will teach the importance of using clear logic and rationale when making comparative judgements. In an everyday sense, it will allow pupils to have greater confidence in taking control of certain aspects of their lives such as managing their finances, making measurements, comparing offers to give but a few examples. Upon leaving Ark Blake Academy, it will provide pupils with a greater level of autonomy in their decision-making and, in addition to the skills being valuable, the content in of itself will give them access to enter a variety of industries where these skills are respected and required.

Design of Subject

We believe in a cumulative mastery curriculum, where pupils will use prior knowledge to build on their conceptual understanding of math concepts throughout the year.

Building on the challenging nature of KS2, the curriculum has been designed to support our vision of every child achieving in mathematics, regardless of background. We have developed a curriculum that will help pupils achieve the highest grades at GCSE, A-Level and subsequently prepare them for university life.

Each half-term will group together topics from the same areas of mathematics helping pupils make connection between the topics. The cumulative nature of the curriculum provides pupils with opportunities to apply previously learnt concepts to a different area of mathematics.

The maths curriculum is shaped by four underlying principles:

1. One curriculum for all
2. Deep understanding
3. Number sense underpinning all
4. Problem solving central

We believe that all of mathematics can be appreciated more fully once a pupil has a deep appreciation of the number system, therefore we put number sense and place value first. By structuring our curriculum so that all pupils in a year group are learning the same content at the same time, we have longer to focus on each topic. Our aim is to use this time to build confidence across a topic with pupils eventually able to succeed with problem-solving questions.

In Key Stage 3, pupils will explore a variety of topics in mathematics developing their fluency and creating the links that connect each area of maths. In addition to enhancing their knowledge, pupils will constantly be challenged to apply what they know to unique problems where the method to solving will not be immediately obvious. Key Stage 4 will provide pupils with the opportunity to work on more demanding problems that require knowledge from two or three different areas of mathematics. Attainment in the prior years will determine if pupils are to take the foundation or higher tier, and their learning will adjust accordingly. Professional judgement will be used to maximise the pupils' chance of achieving as high a grade as possible in their GCSEs. Key stage 5 brings an exciting challenge with pupils introduced to calculus with integration and differentiation allowing greater understanding of algebraic expressions and functions. There is a greater emphasis placed on algebra, trigonometry, mechanics and statistics with pupils taught different concepts simultaneously throughout each term.

Pupils will be set weekly homework tasks designed by their teachers. This will be important in ensuring that they are able to recall the knowledge that they have learnt in school and apply it to problems independently. In addition to working on topics that they are currently learning; pupils will also be recalling knowledge learnt from previous weeks. This practice will lead to pupils being able to recall knowledge much more easily in the future and improve their long-term memory.

Extension of Subject

There will be a variety of extra-curricular activities made available to pupils to allow them to explore the subject of mathematics in a different context. A maths challenge club will exist to give pupils the

opportunity to attempt more complex problems working alongside their peers. This will act to prepare them for the annual UKMT Maths Challenge papers and improve their chances of gaining a certificate from it. Pupils will also have the opportunity to test their use of strategy and logic in a variety of board games and puzzles. These will require a slightly more abstract use of mathematical thinking, and challenges pupils in a different manner. In addition, there will be a variety of STEM activities and opportunities where knowledge of mathematics will be vital in unlocking knowledge in other subjects.

Mathematics opens the doors for endless opportunities at university. Many university courses will require a passing grade (or higher) at GCSE before viewing an application. For pupils taking Mathematics at A-Level their options at university include: Mathematics, Engineering, Computer Science, Medicine, Economics, Physics, Statistics, Denistry, Sports Science amongst many others.

Mathematics at Ark Blake will be challenging, exciting and thought-provoking. We are excited to work with our pupils at every step of the journey and support them in pursuing their passions in life.