



Curriculum Intent of MATHS

September 2021

KS3 Mathematics

Intent

To enable and develop students to become fluent in the fundamentals of mathematics through varied and frequent practice with increasingly complex problems over time. This will enable them to develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

So students can solve problems by applying their mathematics to a variety of routine and non-routine problems, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Mathematics is an essential skill in life and is at the heart of every day decision making. It is the aim of Wexham School to support every student to achieve their potential and develop a deep understanding of Mathematics. The department offers a supportive, nurturing environment focused on developing a culture of success. We strive to ensure that every student achieves their potential and develops a life-long love of learning.

The Key Stage 3 curriculum has been designed to secure and deepen students understanding and confidence with number work and calculations. Develop understanding of shape and space with 3D shapes and angle rules. Students are introduced to algebra and progress into graphs and transformations. They will be taught to represent, summarise, and compare data sets.

The curriculum at Key Stage 3 is tailored to ensure that every student has the opportunity to reach their potential and provides them with a solid foundation to start their GCSE qualification. The curriculum follows three tiered pathways where student performance is reviewed regularly and used to support each student to reach the next step in their journey.

Skills and Knowledge

Through the mathematics content, students will be taught to:

Develop fluency

- consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots, select and use appropriate calculation strategies to solve increasingly complex problems
- use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships
- substitute values in expressions, rearrange and simplify expressions, and solve equations
- move freely between different numerical, algebraic, graphical and diagrammatic representations [for example, equivalent fractions, fractions and decimals, and equations and graphs]
- develop algebraic and graphical fluency, including understanding linear and simple quadratic functions
- use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics.

Reason mathematically

- extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations
- extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically
- identify variables and express relations between variables algebraically and graphically
- make and test conjectures about patterns and relationships; look for proofs or counter-examples
- begin to reason deductively in geometry, number and algebra, including using geometrical constructions

Solve problems

- develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems
- develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics
- begin to model situations mathematically and express the results using a range of formal mathematical representations
- select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems.

GCSE Mathematics

Intent

To enable students to:

- Develop fluent knowledge, skills and understanding of mathematical methods and concepts
- Acquire, select and apply mathematical techniques to solve problems
- Reason mathematically, make deductions and inferences, and draw conclusions
- Comprehend, interpret and communicate mathematical information in a variety of forms appropriate to the information and context.

All these objectives will be met through the teaching and learning of a number of key topics which are; Algebra, Number, Geometry and measures, Statistics, Ratio and Proportion and Probability

Skills and Knowledge

To develop fluency in Mathematics by aiming to:

- consolidate their numerical and mathematical capability from key stage 3 and extend their understanding of the number system to include powers, roots {and fractional indices}
- select and use appropriate calculation strategies to solve increasingly complex problems, including exact calculations involving multiples of π {and surds}, use of standard form and application and interpretation of limits of accuracy
- consolidate their algebraic capability from key stage 3 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions, {and expressions involving surds and algebraic fractions}
- extend fluency with expressions and equations from key stage 3, to include quadratic equations, simultaneous equations and inequalities
- move freely between different numerical, algebraic, graphical and diagrammatic representations, including of linear, quadratic, reciprocal, {exponential and trigonometric} functions
- use mathematical language and properties precisely.

To develop reasoning mathematically by:

- extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically
- extend their ability to identify variables and express relations between variables algebraically and graphically
- looking for proofs or counter-examples; begin to use algebra to support and construct arguments {and proofs}
- reason deductively in geometry, number and algebra, including using geometrical constructions
- interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning
- explore what can and cannot be inferred in statistical and probabilistic settings, and express their arguments formally
- assess the validity of an argument and the accuracy of a given way of presenting information.
- To solve problems in a Variety of Mathematical settings
- develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems
- develop their use of formal mathematical knowledge to interpret and solve problems, including in financial contexts
- make and use connections between different parts of mathematics to solve problems
- model situations mathematically and express the results using a range of formal mathematical representations, reflecting on how their solutions may have been affected by any modelling assumptions
- select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem.

KS5 Mathematics

Intent

To enable students to:

- Understand mathematics and mathematical processes in a way that promotes confidence, fosters enjoyment and provides a strong foundation for progress to further study.
- Extend their range of mathematical skills and techniques.
- Apply mathematics in other fields of study and be aware of the relevance of mathematics to the world of work and to situations in society in general.
- Use their mathematical knowledge to make logical and reasoned decisions in solving problems both within pure mathematics and in a variety of contexts, and communicate the mathematical rationale for these decisions clearly
- Use their mathematical skills and techniques to solve challenging problems that require them to decide on the solution strategy.
- Represent situations mathematically and understand the relationship between problems in context and mathematical models that may be applied to solve them.
- Draw diagrams and sketch graphs to help explore mathematical situations and interpret solutions.
- Make deductions and inferences and draw conclusions by using mathematical reasoning.
- Take increasing responsibility for their own learning and the evaluation of their own mathematical development.

Knowledge and skills

Mathematical argument, language and proof

- Construct and present mathematical arguments through appropriate use of diagrams; sketching graphs; logical deduction; precise statements involving correct use of symbols and connecting language, including: constant, coefficient, expression, equation, function, identity, index, term, variable.
- Understand and use mathematical language and syntax as set out in the content
- Understand and use language and symbols associated with set theory, as set out in the content
- Apply to solutions of inequalities and probability
- Understand and use the definition of a function; domain and range of functions
- Comprehend and critique mathematical arguments, proofs and justifications of methods and formulae, including those relating to applications of mathematics.

Mathematical problem solving

- Recognise the underlying mathematical structure in a situation and simplify and abstract appropriately to enable problems to be solved.
- Construct extended arguments to solve problems presented in an unstructured form, including problems in context.
- Interpret and communicate solutions in the context of the original problem.
- Understand that many mathematical problems cannot be solved analytically, but numerical methods permit solution to a required level of accuracy.
- Evaluate, including by making reasoned estimates, the accuracy or limitations of solutions, including those obtained using numerical methods.
- Understand the concept of a mathematical problem solving cycle, including specifying the problem, collecting information, processing and representing information and interpreting results, which may identify the need to repeat the cycle.
- Understand, interpret and extract information from diagrams and construct mathematical diagrams to solve problems, including in mechanics.

Mathematical modelling

- Translate a situation in context into a mathematical model, making simplifying assumptions.
- Use a mathematical model with suitable inputs to engage with and explore situations (for a given model or a model constructed or selected by the student).
- Interpret the outputs of a mathematical model in the context of the original situation (for a given model or a model constructed or selected by the student).
- Understand that a mathematical model can be refined by considering its outputs and simplifying assumptions; evaluate whether the model is appropriate.
- Understand and use modelling assumptions.