



Students in the top two sets will study this additional qualification, parallel to their GCSE Mathematics. Edexcel Extended Mathematics Certificate fills the gap for high achieving students by assessing their higher order mathematical skills, particularly in algebraic reasoning, thus preparing them fully to maximise their potential in further studies. It offers the opportunity for stretch and challenge that builds on the Key Stage 4 curriculum and is intended as an additional qualification to the GCSE Mathematics, rather than as a replacement. Emphasis is placed on higher order technical proficiency, rigorous argument and problem solving skills. It is designed for those who are expected to achieve, grades 7, 8 and 9 in GCSE mathematics and are likely to progress to A-Level study in Mathematics and possibly Further Mathematics.

Year Group: Year 11 Extended Mathematics Certificate

This is the plan for the taught curriculum during achievement period: Jan - Apr

Brief summary of the topic/work being covered during this period

1. Solve quadratic equations including "hidden quadratics" and those involving trigonometric functions
2. Identify and interpret roots, intercepts and turning points both graphically and by completing the square where the coefficient of x^2 is not = to 1
3. Understand the link between the discriminant and the roots of a quadratic equation
4. Solve, by substitution, two simultaneous equations including one quadratic/one linear
5. Solve linear and quadratic inequalities, represent solutions using set notation
6. Given a function, find the inverse function. An understanding of Domain and Range
7. Know and apply the sine and cosine rule, proof of the sine rule using Pythagoras
8. Know and apply the area formula: Area = $\frac{1}{2} ab\sin C$ including in 3D

Prior knowledge needed for this unit/topic from previous teaching

1. Solve quadratics and linear equations using a variety of methods
2. Solve simultaneous equations algebraically and graphically
3. Trigonometric ratios for right-angled triangles
4. Apply Pythagoras and trigonometric ratios to 3D problems

Rationale for students studying this unit/topic

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1. Develop knowledge, skills and understanding of higher order mathematical methods and concepts
2. Acquire and use problem solving strategies including the use of algebra as a tool for solving problems
3. Select, apply and link mathematical techniques and methods to solve challenging and non-routine problems
4. Reason mathematically, make deductions and inferences and draw conclusions
5. Interpret and communicate mathematical information in a variety of forms appropriate to the information and context including rigorous use of algebraic argument and formal proof.
6. Provides an introduction to calculus and matrices for students who are likely to progress their study

Rationale for timing of this topic

1. The application of Pythagoras and trigonometry to right angled triangles complements the work of GCSE maths at this time, extended to include the angle between a line and a plane and the angle between two planes
2. The extended use of Pythagoras and trigonometry is along-side its study at GCSE.
3. The drawing and sketching of functions and interpretation of graphs is taught in the current GCSE topic. However this is extended to include exponential functions with up to 3 domains.
4. The use of function notation, for example $f(x)$ and the defining of domain and range cements understanding of the function work covered at GCSE and use of the inverse function $f^{-1}(x)$ aids work on changing the subject of a complex algebraic expression

Key concepts/ideas that are taught to students in this unit/topic, including any anticipated gaps in knowledge and plan to overcome these

- When estimating values from a graph, it is important that students understand it is an 'estimate'.
- It is important to stress that when expanding quadratics, the x terms are also collected together.
- Quadratics involving negatives sometimes cause numerical errors.
- Some may think $f^{-1}(x) = \frac{1}{f(x)}$ and that $fg(x)$ means 'do $f(x)$ first then $g(x)$ '
- Many think that $ff(x)$ means $(f(x))^2$

New key terminology students will be taught during this topic/unit

Quadratic, solution, root, linear, solve, simultaneous, inequality, completing the square, factorise, rearrange, surd, function, solve, circle, sets, union, intersection

Axes, coordinates, sine, cosine, tan, angle, graph, transformations, side, angle, inverse, square root, 2D, 3D, diagonal, plane, cuboid

Plan for Assessment

- Informal assessment is ongoing through class work, contributions to class discussion and teacher assessment during lessons.
- Teacher's record homework marks for GCSE each week on a centrally held department tracker; the homework tasks are detailed on the schemes of work and outlined centrally within the department to ensure consistency across all classes. Teachers will take in and formally mark a written piece of homework once every two weeks. Students will then have time during a subsequent lesson to review their work and make any corrections
- Formal assessment for Edexcel Extended Mathematics Certificate will take place during this achievement period. The necessary skills are covered in a synoptic paper that aims to assess students' progress in mathematics generally and covers questions from all topics that have been covered at any point in the students' mathematical history (not just this academic year).
- Mini start-of-topic tests will provide information for teachers regarding prior knowledge and existing misconceptions and mini end-of-topic tests will help students and teachers see the progress that has been made over the course of the teaching of the topic.