TOPIC OVERVIEW DOCUMENT

YEAR 13

TOPIC OVERVIEW:

Students develop advanced mathematical knowledge across trigonometry, calculus, statistics and mathematical modelling. They learn to apply mathematical concepts to real-world situations, analyse change using differentiation and integration, model data and motion, and use numerical methods to solve complex problems. Alongside this, students develop the disciplinary skills needed to think and work like mathematicians by reasoning logically, solving problems systematically, interpreting and evaluating results, and communicating mathematical arguments clearly. They learn to make connections between different areas of mathematics, justify their conclusions using evidence, and apply advanced techniques with accuracy and confidence. Together, these topics build mathematical fluency, resilience and critical thinking, providing a strong foundation for further study in mathematics and related fields.

Key Vocabulary (T2)	Key Vocabulary (T3)	Core knowledge	Disciplinary Skills
Analyse, apply, approximate, calculate, compare, conclude, connect, construct, critique, describe, determine, evaluate, explain, identify, interpret, justify, model, predict, reason and solve**.**	Trigonometric identity, trigonometric equation, mathematical model, parametric equation, parameter, Cartesian equation, differentiate, derivative, stationary point, optimisation, numerical method, iteration, approximation, integrate, definite integral, normal distribution, probability, standard deviation, displacement and acceleration.	Students develop advanced knowledge of **trigonometry, calculus, statistics and mathematical modelling**. They learn to apply trigonometric concepts to real-world situations, work with parametric equations, use differentiation and integration to analyse change and solve problems, apply numerical methods to find approximate solutions, model data using the normal distribution, and study motion through further kinematics. Together, these topics deepen students' understanding of mathematical relationships, modelling, calculus and statistics, providing a strong foundation for further study in mathematics and related fields.	Students develop the disciplinary skills needed to think and work like mathematicians when studying trigonometry and modelling, parametric equations, differentiation, numerical methods, integration, normal distribution and further kinematics. They learn to apply logical reasoning, analyse mathematical relationships, select appropriate methods and solve complex problems systematically. Students develop confidence in interpreting and modelling real-world situations, communicating mathematical arguments clearly, and evaluating the validity of their solutions. They also strengthen their ability to make connections between different areas of mathematics, work accurately with advanced techniques, and justify conclusions using evidence and mathematical reasoning.

			These skills build resilience, critical thinking and mathematical fluency, preparing students for success in advanced mathematics and further study.

Checkpoint: Vocab/ Knowledge/ Disciplinary skill(s)	**What does this assessment look like?**	**Which disciplinary skills do I need to be successful?**
Checkpoint 1: Trig functions	You will complete an end of unit assessment at the end of the topic	Students develop the skills needed to think like mathematicians by solving problems, reasoning logically and analysing complex situations. They learn to identify patterns, select appropriate methods, communicate their reasoning clearly and evaluate their solutions. These skills build confidence, resilience and critical thinking, preparing students for success in advanced mathematics and future study.
Checkpoint 2: Trig and modelling	You will complete an end of unit assessment at the end of the topic	To be successful in **Trigonometry and Modelling**, you need to apply trigonometric concepts to solve problems and model real-world situations. You should be able to interpret mathematical relationships, select appropriate methods, analyse results, and justify your conclusions. Success requires logical reasoning, accurate communication, and the ability to connect graphical, algebraic and trigonometric representations. These skills develop mathematical fluency, problem-solving and critical thinking in Y13 Mathematics.
Checkpoint 3: Parametric equations	You will complete an end of unit assessment at the end of the topic	To be successful in **Parametric Equations**, you need to understand how coordinates can be represented using a parameter and how parametric relationships connect algebraic and graphical representations. You should be able to manipulate equations, interpret and sketch graphs, eliminate parameters, and apply mathematical reasoning to solve problems. Success requires logical thinking, accuracy, and the ability to communicate and justify your methods clearly. These skills develop mathematical fluency, problem-solving and analytical thinking in Y13 Mathematics.
Checkpoint 4: Differentiation	You will complete an end of unit assessment at the end of the topic	To be successful in **Differentiation**, you need to understand how functions change and use differentiation techniques to analyse gradients, rates of change and the behaviour of graphs. You should be able to apply differentiation rules accurately, interpret results in context, and use derivatives to solve problems involving stationary points, optimisation and mathematical modelling. Success requires logical reasoning, careful analysis and the ability to communicate and justify your

		methods clearly. These skills develop mathematical fluency, problem-solving and analytical thinking in Y13 Mathematics.
Checkpoint 5: Numerical methods	You will complete an end of unit assessment at the end of the topic	To be successful in **Numerical Methods**, you need to use mathematical techniques to find approximate solutions to problems that cannot be solved exactly. You should be able to apply iterative processes accurately, interpret numerical results, and evaluate the reliability of your answers. Success requires logical reasoning, attention to detail, and the ability to communicate and justify your methods clearly. These skills develop mathematical fluency, problem-solving and analytical thinking in Y13 Mathematics.
Checkpoint 6: Integration	You will complete an end of unit assessment at the end of the topic	To be successful in **Integration**, you need to understand how integration can be used to find areas, accumulate quantities and reverse the process of differentiation. You should be able to apply integration techniques accurately, interpret results in context, and use integration to solve mathematical and real-world problems. Success requires logical reasoning, attention to detail, and the ability to communicate and justify your methods clearly. These skills develop mathematical fluency, problem-solving and analytical thinking in Y13 Mathematics.
Checkpoint 7: Conditional probability	You will complete an end of unit assessment at the end of the topic	To be successful in these Y13 topics, you need to apply mathematical reasoning, problem-solving and analytical thinking to a range of complex situations. You should be able to interpret and model mathematical relationships, use appropriate techniques accurately, analyse and evaluate results, and justify your methods clearly. Success requires logical thinking, attention to detail, and the ability to connect different areas of mathematics when solving unfamiliar problems. These skills develop mathematical fluency, confidence and resilience, preparing you for advanced study in mathematics.
Checkpoint 8: Normal Distribution	You will complete an end of unit assessment at the end of the topic	o be successful in **Normal Distribution**, you need to understand how data can be modelled using a normal distribution and how probabilities can be calculated and interpreted. You should be able to use statistical information to find probabilities, analyse data, and make informed conclusions in context. Success requires logical reasoning, accuracy, and the ability to interpret and communicate statistical results clearly. These skills develop mathematical fluency, problem-solving and analytical thinking in Y13 Mathematics.

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Checkpoint 9: Further kinematics	You will complete an end of unit assessment at the end of the topic	To be successful in **Further Kinematics**, you need to apply mathematical models to describe and analyse motion in more complex situations. You should be able to interpret physical scenarios, use kinematic equations accurately, and analyse relationships between displacement, velocity and acceleration. Success requires logical reasoning, problem-solving and the ability to connect algebraic, graphical and calculus-based methods. These skills develop mathematical fluency, analytical thinking and confidence in applying mathematics to real-world contexts in Y13 Mathematics.

Milestone assessment: The average of the following unit tests: : Trig functions; Parametric equations; Differentiation; Numerical methods; Integration; Conditional probability; Normal distribution; Further kinematics		
Vocab: trigonometric identity, trigonometric equation, mathematical model, parametric equation, parameter, Cartesian equation, differentiate, derivative, stationary point, optimisation, numerical method, iteration, approximation, integrate, definite integral, normal distribution, probability, standard deviation, displacement and acceleration.	**Knowledge tasks:** Students build advanced mathematical knowledge across trigonometry, calculus, statistics and mathematical modelling. They learn to apply trigonometric concepts in a range of contexts, work with parametric equations, use differentiation and integration to model and analyse change, apply numerical methods to find approximate solutions, and interpret data using the normal distribution. They also develop their understanding of motion through further kinematics. These topics strengthen students' problem-solving, reasoning and analytical skills while deepening their understanding of mathematical relationships, preparing them well for further study in mathematics, science, engineering and other related fields.	**Disciplinary tasks:** Students develop their understanding of probability by exploring how the likelihood of one event can be affected by another. They learn to analyse relationships between events, use probability diagrams and calculations to solve increasingly complex problems, and interpret results in context. Throughout this topic, students strengthen their logical reasoning, problem-solving and decision-making skills, learning to justify conclusions using mathematical evidence and communicate their thinking clearly. These skills support success in further study and help students make sense of uncertainty and risk in real-world situations.

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How can I achieve in this topic?

- Complete all exercises in the unit
- Engage 100% in lessons
- Use self-study periods to complete the mixed exercises
- Make good notes/examples in lessons and use them

Further research:

- Maths Genie • Learn A Level Maths for Free
- Calculator Suite - GeoGebra