Queen Elizabeth's Girls' School

Founded in 1888

Educating Women of the Future

Maths Key Stage 5 Curriculum

	Topic/Big Question	Focus
Year 12	How can we use algebra to model real world scenarios? Are algebraic models limited in their application?	Half Term 1 focuses primarily on algebraic fluency. Learners will continue to master the skills of algebraic manipulation by considering linear, quadratic, and cubic functions and their graphs. Special attention is given to the modeling of real world scenarios involving direct proportion, the parabolic flight of an object,
	How do mathematicians use data to create models that can predict weather patterns, the rise and fall of global tides, the lifespan of an ecological habitat, the number of vehicles that will pass through a crossroad, and much more?	Half term 2 marks the beginning of the applied mathematics course. Learners will begin to consider statistical data and how it can be used to model real life situations. Additionally, students will delve deeper into the applications of trigonometric functions and graphs.
	How can probability be used to increase the efficiency and productivity of a machine or an athlete? During the planning phase, how do engineers model the forces acting on a structure?	During half term 3 learners will explore a range of topics within probability. This ranges from fundamental concepts taught in GCSE to the applications in statistical distributions and hypothesis testing. Concurrently, students will further develop their knowledge of vectors by modelling and solving geometric problems.
	Why is calculus one of the most versatile tools a mathematician can use? How can elements of pure maths become relevant in the physical world?	During Half term 4, learners will begin to look at calculus and its applications in the real world. There will be a focus on differentiation and how it can be used to model the rate of change in many different scenarios. They will apply this knowledge as they consider objects traveling with a constant acceleration and the forces acting on them.
	How does Earth's gravitational force affect free falling objects? How do engineers calculate the maximum weight that can be safely lifted by a pulley?	Within half term 5, learners are introduced to integration. They will master how to integrate a range of functions and discover how integrals can be used to find the exact area of irregular shapes and solids. Additionally, learners will develop their understanding of forces & motion and variable acceleration within mechanics.
	How were mathematical functions used to decode enemy messages during World War II? How are series and sequences useful to scientists in predicting the spread of a virus?	During the final half term of year 1, learners will begin to engage with topics from the year 2 A level curriculum. They will analyse functions and further expand their knowledge of proofs. The foundation for many concepts taught in year 13 will be constructed by further diving into partial fractions, series, and sequences.

	Topic/Big Question	Focus
Year 13	How were mathematical functions used to decode enemy messages during World War II? How are series and sequences useful to scientists in predicting the spread of a virus?	During half term 1, learners will analyse functions and further expand their knowledge of proofs. The foundation for many concepts taught in year 13 will be constructed by further mastery of partial fractions, series, and sequences. **Functions, Sequences, and series**
	How do civil engineers use trigonometric functions to design and build bridges? How do bookmakers use real time data to manage the odds in a sporting event?	Half term 2 focuses on solidifying the learners' understanding of trigonometric functions and graphs. Learners will also complete their understanding of probability by studying conditional probabilities. **Trigonometry modelling and regression correlation, and hypothesis testing** **Conditional probability**
	How has the average height of people in England changed over the last 200 years? How can scientists track physical changes (like height or wingspan) of a species over many decades? How do engineers use moments to calculate the maximum safe weight that can be applied to a crane?	In half term 3, learners will conclude the statistics portion of the A level maths course. They will have a secure knowledge of statistical distributions and how they can be used to test various hypotheses. Concurrently, they will focus on further applications of topics in mechanics such as friction and projectiles. **Normal distribution, moments, forces and friction**
	How can engineers calculate the stopping distance of a car or lorry travelling at a high speed?	During half term 4, learners will aim to get a more complete understanding of differentiation and its use. This will include differentials of trigonometric functions, implicit differentiation, and differentiating no standard functions by using the product rule, quotient rule, and chain rule. In mechanics, learners will develop their understanding of the many applications of forces. **Application of Forces, differentiation**
	How is calculus used to estimate the age of fossilised plants and animals?	Half term 5 concludes the A level course and much time will be spent in preparation for summer exams. To culminate the learning that has taken place over the previous 2 years, learners will focus on expanding their knowledge of integration by considering non standard functions that can be integrated using partial fractions, substitution, and integration by parts. In mechanics, learners will consider the applications of kinematics and further study of vectors. **Kinematics, Integration, vectors**