Y13 F Maths	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Theme/Big Idea	Developing Advanced Mathematical Analysis and Optimisation for Solving Complex Theoretical and Real-World Problems	Developing Advanced Mathematical Modelling and Optimisation through Calculus, Polar Geometry and Networks	Developing Advanced Mathematical Modelling and Strategic Thinking through Differential Equations, Hyperbolic Functions and Decision Mathematics	Developing Advanced Mathematical Modelling and Decision-Making for Analysing Dynamic Systems and Uncertainty	Consolidating Mathematical Understanding and Developing Examination Confidence Through Deliberate Practice	
Content What are they learning? (including keywords)	**2CP2** Students prove series formulae using the method of differences, investigate patterns in higher derivatives and develop Maclaurin series expansions for functions and composite functions. **2CP3** Students investigate improper integrals, mean values of functions and inverse trigonometric functions. They apply advanced integration techniques including partial fractions, completing the square and inverse trigonometric integration.	**2CP4** Students extend volume of revolution techniques to a wider range of functions, including parametric curves. They apply integration methods to model and solve real-world problems involving three-dimensional shapes. **2CP5** Students investigate curves represented in polar form, sketching graphs and converting between polar and Cartesian equations. They use differentiation and integration to find	**2CP6** Students investigate hyperbolic functions and their inverses, exploring their graphs, identities and algebraic properties. They solve equations, prove identities, and apply differentiation and integration techniques involving hyperbolic functions. **2CP7** Students develop techniques for solving first- and second-order differential equations. They find general and particular solutions, apply boundary conditions and model real-world situations	**2CP8** Students apply differential equations to model interconnected rates of change, simple harmonic motion and oscillatory systems. They extend these techniques to damped and forced motion and solve coupled differential equations describing relationships between interdependent variables. **D2-8** Students develop decision-making models using decision trees, incorporating probabilities, outcomes and	Students consolidate and extend their understanding of the course through structured practice of past examination questions under both timed and untimed conditions. They refine methods, improve accuracy and application, and develop effective examination techniques through the analysis of mark schemes, examiner reports and common misconceptions. Through regular exposure to examination-style questions, students	Activity will continue as in Term 5 until exams are complete.

	D2-2 Students use the Hungarian algorithm to assign tasks and resources efficiently. They solve minimisation and maximisation problems, developing optimisation strategies for real-world allocation situations. **D2-3** Students begin to analyse flow networks using maximum-flow minimum-cut theory and flow-augmenting algorithms. They determine the maximum capacity of networks and model problems involving transportation, communication and resource distribution. **Key vocabulary listed in Appendix 1**	tangents and calculate areas enclosed by polar curves. **D2-4** Students continue to analyse flow networks using maximum-flow minimum-cut theory and flow-augmenting algorithms. They determine the maximum capacity of networks and model problems involving transportation, communication and resource distribution. **D2-5** Students apply Bellman's Principle of Optimality to break complex decision problems into simpler stages. They use states, stages and recursion relationships to develop efficient solutions to optimisation and resource allocation problems. **Key vocabulary listed in Appendix 1**	involving changing quantities. **D2-6** Students study two-person zero-sum games, developing strategies using dominance, play-safe methods and payoff matrices. They determine optimal solutions using graphical methods and linear programming to model competitive decision-making. **D2-7** Students solve first- and second-order recurrence relations, forming closed solutions and applying them to model growth and change. They develop understanding of complementary functions and particular solutions within recurrence models. **Key vocabulary listed in Appendix 1**	expected values. They evaluate decisions using expected monetary value and utility theory, considering risk and uncertainty to identify optimal strategies in real-world situations. **Key vocabulary listed in Appendix 1**	also develop confidence in managing their time effectively, improving the speed, efficiency and accuracy with which they select and apply appropriate methods under examination conditions.	
Skills	Apply mathematical reasoning to identify	Apply advanced calculus techniques to	Apply advanced function and calculus	Apply differential equations to model	Apply mathematical knowledge fluently	

How are they learning it?	patterns in series, derivatives and function behaviour to construct and justify general results. Use advanced calculus techniques to analyse functions, evaluate integrals and model mathematical relationships. Apply optimisation methods to allocation and routing problems, selecting and evaluating efficient solution strategies. Apply network algorithms to model and optimise flow through complex systems and identify capacity constraints.	model three-dimensional shapes and solve problems involving area, volume and rates of change. Use mathematical reasoning to interpret and analyse curves represented in both Cartesian and polar forms. Apply network algorithms to model and optimise flow through complex systems and identify capacity constraints. Use dynamic programming methods to solve multi-stage decision problems efficiently through recursive reasoning.	techniques to analyse hyperbolic functions and solve equations involving rates of change. Use differential equations to model dynamic systems and determine general and particular solutions. Apply mathematical reasoning to evaluate strategic decision-making using game theory and optimisation techniques. Use recursive thinking to identify patterns, develop closed forms and model long-term behaviour in sequences.	changing systems, oscillatory motion and relationships between interconnected variables. Use mathematical reasoning to interpret solutions and evaluate the behaviour of dynamic systems over time. Apply decision-analysis techniques to evaluate choices involving uncertainty, probability and risk. Use expected value and utility methods to compare strategies and justify optimal decisions.	and accurately across a wide range of examination-style questions. Develop effective strategies for selecting, applying and communicating appropriate mathematical methods Use examiner feedback, mark schemes and model solutions to improve accuracy and maximise marks. Build confidence and resilience through timed practice and reflection on performance. Evaluate and refine examination technique to improve efficiency, precision and problem-solving under pressure.	
Key Questions	**How** can patterns in derivatives be used to construct series expansions, **why** are these approximations useful, and **how** can they model functions? **What** do advanced integration techniques	**How** can integration be used to model and calculate volumes of complex shapes, and **why** is this important in real-world applications? **What** advantages do polar coordinates	**What** are hyperbolic functions, **why** do they provide useful mathematical models, and **how** can their identities and calculus be applied? **How** do differential equations model	**How** can differential equations model changing and interconnected systems, **why** are these models important, and **how** can they be used to solve real-world problems?	**What** makes a mathematical solution successful, **why** do examiners award marks in particular ways, and **how** can this improve performance? **How** can past papers, mark schemes and	

	reveal about functions, **why** are limiting processes important, and **how** can they be used to solve complex problems? **How** can optimisation algorithms allocate resources efficiently, **why** is finding the best solution important, and **how** can mathematical models support decision-making? **How** can network flow algorithms identify capacity limits, **why** is maximising flow important, and **how** can these models support decision-making?	provide, **why** do some curves lend themselves to polar representation, and **how** can we analyse them? **How** can network flow algorithms identify capacity limits, **why** is maximising flow important, and **how** can these models support decision-making? **What** is Bellman's Principle of Optimality, **why** does it simplify complex decisions, and **how** can it be used to find efficient solutions?	change, **why** are general and particular solutions important, and **how** can they be used to solve problems? **What** makes a strategy optimal in a competitive situation, **why** must the actions of others be considered, and **how** can game theory identify the best decision? **How** can recurrence relations model long-term behaviour, **why** are closed forms useful, and **how** can they be applied to real-world situations?	**What** do differential equations reveal about oscillatory motion, **why** do systems exhibit behaviours such as damping and resonance, and **how** can these behaviours be modelled mathematically? **How** can decision trees represent uncertainty, **why** is expected value useful, and **how** can it support effective decision-making? **What** is utility theory, **why** might the best decision differ from the highest monetary value, and **how** can utility be used to model risk and preference?	examiner reports help identify strengths and areas for development? **Why** is examination technique important, and **how** can accuracy, communication and time management be improved?	
Assessment (specific assessed piece(s); milestone(s))	L Review 2CP2 L Review 2CP3 L Review D2-2 L Review D2-3	L Review 2CP4 L Review 2CP5 L Review D2-4 December exams	L Review 2CP6 L Review 2CP7 L Review D2-5 L Review D2-6	L Review 2CP8 L Review D2-8 March exams	Past paper questions assessed weekly	