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education

# MATHS

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## HSC MATHEMATICS EXTENSION 1 PROGRAM

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## YEAR 10: MATHEMATICS PROGRAM OVERVIEW

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### YEAR OVERVIEW

By the end of year 12, students are able to manipulate to solve and sketch algebraic equations and inequalities involving surds, indices, quadratics, exponentials, logarithms, absolute values and trigonometric identities. They can solve problems involving permutations and combinations, polynomials and circle geometry. Students can differentiate and integrate a variety of functions and apply the use of stationary points, points of inflexions and asymptotes for sketching, and calculate various areas using integration. Students can apply calculus to the physical world. They can switch between the Cartesian formula and parametric representation, and identify and solve arithmetic and geometric progression.

## SEQUENCE OF TOPICS

Year 11

Module	Topic	Weeks required (40 in total)
<b>1) Basic Arithmetic and Algebra (3 Weeks)</b>	Arithmetic Operations & Equations	1.5
	Inequalities	1.5
<b>2) Real Functions of a Real Variable and their Geometrical Representation (3 Weeks)</b>	Function Notation	1
	Curve Sketching and Interpretation	2
<b>3) Trigonometric Ratios (6 Weeks)</b>	Review of Ratios, including the unit circle	1
	Applications of Trigonometry	1
	Trigonometric Functions	1
	Trigonometric Identities	1
	Three Dimensional Trigonometry	2
<b>4) Plane Geometry (3 Weeks)</b>	Introduction to Geometry	1
	Congruence and Similarity	2
<b>5) Linear Functions (3 Weeks)</b>	Definition of a Linear Function	1
	Properties of a Linear Function	2
<b>6) The Quadratic Polynomial (7 Weeks)</b>	Definition of the Quadratic Polynomial	2
	The Parabola as a Locus	2
	Parametric Representation	3
<b>7) The Derivative (3 Weeks)</b>	Definition	1
	Differentiation Techniques	2
<b>8) The Geometry of the Derivative (4 Weeks)</b>	Applications of the Derivative	4
<b>9) Integration (7 Weeks)</b>	The Definite Integral	1
	Approximate Methods	1
	Applications of Integration	3
	Methods of Integration	2
<b>10) Series and Applications (5 Weeks)</b>	Arithmetic and Geometric Progression	3

	Mathematical Induction	2
<b>11) Polynomials (5 Weeks)</b>	Definition	2
	The Remainder and Factor Theorem	2
	Iterative Methods	1

Year 12

Module	Topic	Weeks required (40 in total)
<b>1) Logarithmic and Exponential Functions (4 Weeks)</b>	Definition and Laws	2
	Differentiation and Integration	2
<b>2) Trigonometric Functions (6 Weeks)</b>	Circular Measure	1
	Functions	2
	Differentiation and Integration	3
<b>3) Functions and their Inverse Trigonometric Functions (5 Weeks)</b>	Definition	1.5
	Sketching	1.5
	Differentiation and Integration	2
<b>4) Applications of Calculus to the Physical World (9 Weeks)</b>	Rates of Change with Respect to Time and Displacement	3
	Simple Harmonic Motion	2
	Projectile Motion	2
	Exponential Growth and Decay	2
<b>5) Circle Geometry (4 Weeks)</b>	Applications	4
<b>6) Probability (2 Weeks)</b>	Applications to Various Events	2
<b>7) Permutations and Combinations (2 Weeks)</b>	Applications to Various Events	2

## ASSESSMENT

All students will be required to sit a topic test exam at the conclusion of the allocated period of study. Parents will be notified of assessment results through the semesterly report. Parents will be contacted if student performance is poor and requires remedial action.

## ASSESSMENT OUTCOMES

- performs routine arithmetic and algebraic manipulation involving surds, simple rational expressions and trigonometric identities
- chooses and applies appropriate arithmetic, algebraic and graphical techniques
- solves problems involving inequalities
- understands the concept of a function and the relationship between a function and its graph
- Understands trigonometric relationships and able to solve a range of problems
- solves problems involving permutations and combinations, polynomials and circle geometry
- relates the derivative of a function to the slope of its graph
- determines derivatives which require the application of more than one rule of differentiation
- understands and uses the language and notation of calculus
- uses the parametric representation together with differentiation to identify geometric properties of parabolas
- relates the derivative of a function to the slope of its graph
- determines derivatives which require the application of more than one rule of differentiation
- understands and uses the language and notation of calculus
- uses the parametric representation together with differentiation to identify geometric properties of parabolas
- manipulates algebraic expressions involving logarithmic and exponential functions
- expresses practical problems in mathematical terms based on simple given models
- applies appropriate techniques from the study of calculus, geometry and trigonometry to solve problems
- uses a variety of strategies to investigate mathematical models of situations involving exponential growth and decay
- Able to identify the difference between an arithmetic and geometric progression to solve complex problems
- applies the chain rule to problems including those involving velocity and acceleration as functions of displacement
- Uses simple probability techniques to solve a range of problems
- applies appropriate techniques from the study of calculus, geometry, probability, trigonometry and series to solve problems
- uses a variety of strategies to investigate mathematical models of situations involving, projectiles and simple harmonic motion
- Able to apply calculus techniques to the real world
- Uses simple probability techniques to solve a range of problems
- applies appropriate techniques from the study of calculus, geometry, probability, trigonometry and series to solve problems
- uses a variety of strategies to investigate mathematical models of situations involving binomial probability and binomial theorem



#### PLAGIARISM AND ACADEMIC INTEGRITY

Uplift Education has a zero-tolerance plagiarism policy. In the case that plagiarism is found in a student's work, Uplift Tutors may penalize students with a reduction of marks, or in more serious cases, Uplift Education reserves the right to deny service to the student. Uplift Education defines plagiarism in the forms of:

Copying: using the same or very similar words to an original piece of work without acknowledgement or credit, or acquiring another person's academic work and copying it.

Inappropriate paraphrasing: changing words and/or phrases while retaining the original structure and/or information without acknowledgement or credit.

*\*A more detailed Yearly Program will be provided upon your child's enrolment at Uplift Education.*