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education

# MATHS

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## HSC MATHEMATICS ADVANCED PROGRAM

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## HSC: MATHEMATICS ADVANCED PROGRAM OVERVIEW

### STAFF CONTACT DETAILS

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### YEAR OVERVIEW

By the end of Year 12, students are able to solve and sketch algebraic functions and inequalities involving rational numbers, surds, indices, quadratics and cubics, simple algebraic fractions and absolute functions. They use trigonometric ratios and rules, can calculate the area of non right-angled triangles and sketch trigonometric functions. Students apply deductive reasoning to proofs and numerical exercises involving plane figures. Students are able to use rules of differentiation and integration and apply calculus geometrically as in rates of change and exponential growth and decay. They list outcomes for multi-step chance experiments and assign probabilities for these experiments.

## SEQUENCE OF TOPICS

Year 11

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

Module	Topic	Weeks required (40 in total)
<b>1) Logarithmic and Exponential Functions (5 Weeks)</b>	Definition and Laws	2
	Differentiation and Integration	3
<b>2) Trigonometric Functions (6 Weeks)</b>	Function Notation	1
	Curve Sketching and Interpretation	4
	Circular Measure	1
	Functions	2
	Differentiation and Integration	3
<b>3) Applications of Calculus to the Physical World (5 Weeks)</b>	Velocity and Acceleration	3
	Exponential Growth and Decay	2
<b>4) Probability (5 Weeks)</b>	Experiments with various events	5

## 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

- Manipulation of arithmetical operations on rational numbers, quadratic surds, simple algebraic fractions, inequalities and absolute values
- Linear equations and inequalities, quadratic equations (completing the square) and simultaneous equations
- Recognise the independent and dependent variables, function notation, range and domain
- Sketch: linear, quadratic, cubic, exponential, hyperbolic, circles, absolute functions, and apply regions and inequalities
- Uses trigonometric ratios, including the unit circle, bearings and angles of elevation and depression, sine and cosine rules, area formula, inverse trigonometric ratios and sketches all trigonometric functions
- Applies rules of congruency, similarity and Pythagoras theorem effectively
- Recognise the linear function formula and sketch, determines the intersection between two lines and the corresponding regions in linear inequalities
- Calculate the distance and midpoint between two points on a Cartesian plane, and the perpendicular distance of a point from a line
- Solve and sketch quadratic equations and inequalities
- Understand first principle's differentiation and calculate the derivative of a function
- Determine stationary points and asymptotes to sketch a function
- Calculate the area under the curve using integration, find the area between two curves, and approximate areas using the Trapezoid and Simpsons rule
- Use index and logarithmic laws
- Sketch and differentiate exponentials and logarithmic functions
- Use circular measure of angles, approximate, expand, differentiate and integrate trigonometric ratios and apply double angle formulas
- Use rates of change as derivatives with respect to time, applying to determine velocity and acceleration
- Calculate exponential growth and decay and rate of change of a population
- Determines the probability in a series of experiments

## 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 persons' 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.*