Syllabus overview / assessment MATHS HL

Component	Recommended teaching hours
Topic 1 Algebra	30
Topic 2 Functions and equations	22
Topic 3 Circular functions and trigonometry	22
Topic 4 Vectors	24
Topic 5 Statistics and probability	36
Topic 6 Calculus	48
Option syllabus content Students must study one of the following options. ***Topic 7*** Statistics and probability ***Topic 8*** Sets, relations and groups ***Topic 9*** Calculus ***Topic 10*** Discrete mathematics	48
Mathematical exploration A piece of individual written work that involves investigating an area of mathematics.	10

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External		5	80
Paper 1 (non-calculator)	Section A: Compulsory short-response questions based on the core syllabus. Section B: Compulsory extended-response questions based on the core syllabus.	2	30
Paper 2 (graphical display calculator required)	Section A: Compulsory short-response questions based on the core syllabus. Section B: Compulsory extended-response questions based on the core syllabus.	2	30
Paper 3 (graphical display calculator required)	Compulsory extended-response questions based mainly on the syllabus options.	1	20
Internal			20
Mathematical exploration	The individual exploration is a piece of written work that involves investigating an area of mathematics.		

An overview

- Maths Vocab:
  - $+ \ - \ \times \ \div \ = \ \approx$ ([{ x y z $^{2\,3\,4\,5\,\ldots}$ 2x 3x ½ 1/3 ¼ 1/5 1/283 $> \ < \ \ll \ \gg \ \pm \ \infty \ \neq \ \approx \ \leq \ \geq$ $\sqrt{x}$ $\sqrt[3]{x}$ $\alpha \ \beta \ \gamma \ \in$ % $\emptyset \ \partial \ \forall \ \pi$ 0.312 .312
  - Line, square, dot, circle, cube, rectangle, trapezoid, equation ….
  - Difference between . and ,

- TIPS:
  - Thinking in Italian or English? ….
  - Professor/student relationship
  - A two-year look: tests, mock exams, prep time, how to prepare for the final exam: little steps
  - MATHS HL vs SL vs Studies
  - Swapping subjects….
- Uploading docs on my website to keep an organised track of our progress
- ?

Prerequisites

Students must be familiar with SI (*Système International*) units of length, mass and time, and their derived units.

Topic	Content
Number	Routine use of addition, subtraction, multiplication and division, using integers, decimals and fractions, including order of operations. Rational exponents. Simplification of expressions involving roots (surds or radicals), including rationalizing the denominator. Prime numbers and factors (divisors), including greatest common divisors and least common multiples. Simple applications of ratio, percentage and proportion, linked to similarity. Definition and elementary treatment of absolute value (modulus), $\lvert a \rvert$. Rounding, decimal approximations and significant figures, including appreciation of errors. Expression of numbers in standard form (scientific notation), that is, $a \times 10^k$, $1 \leq a < 10$, $k \in \mathbb{Z}$.
Sets and numbers	Concept and notation of sets, elements, universal (reference) set, empty (null) set, complement, subset, equality of sets, disjoint sets. Operations on sets: union and intersection. Commutative, associative and distributive properties. Venn diagrams. Number systems: natural numbers; integers, $\mathbb{Z}$; rationals, $\mathbb{Q}$, and irrationals; real numbers, $\mathbb{R}$. Intervals on the real number line using set notation and using inequalities. Expressing the solution set of a linear inequality on the number line and in set notation. Mappings of the elements of one set to another; sets of ordered pairs.

Topic	Content
Algebra	Manipulation of linear and quadratic expressions, including factorization, expansion, completing the square and use of the formula. Rearrangement, evaluation and combination of simple formulae. Examples from other subject areas, particularly the sciences, should be included. Linear functions, their graphs, gradients and y-intercepts. Addition and subtraction of simple algebraic fractions. The properties of order relations: $<, \leq, >, \geq$. Solution of linear equations and inequalities in one variable, including cases with rational coefficients. Solution of quadratic equations and inequalities, using factorization and completing the square. Solution of simultaneous linear equations in two variables.
Trigonometry	Angle measurement in degrees. Compass directions. Right-angle trigonometry. Simple applications for solving triangles. Pythagoras' theorem and its converse.
Geometry	Simple geometric transformations: translation, reflection, rotation, enlargement. Congruence and similarity, including the concept of scale factor of an enlargement. The circle, its centre and radius, area and circumference. The terms arc, sector, chord, tangent and segment. Perimeter and area of plane figures. Properties of triangles and quadrilaterals, including parallelograms, rhombuses, rectangles, squares, kites and trapeziums (trapezoids); compound shapes. Volumes of cuboids, pyramids, spheres, cylinders and cones. Classification of prisms and pyramids, including tetrahedra.
Coordinate geometry	Elementary geometry of the plane, including the concepts of dimension for point, line, plane and space. The equation of a line in the form $y = mx + c$. Parallel and perpendicular lines, including $m_1 = m_2$ and $m_1 m_2 = -1$. The Cartesian plane: ordered pairs (x, y), origin, axes. Mid-point of a line segment and distance between two points in the Cartesian plane.
Statistics and probability	Descriptive statistics: collection of raw data, display of data in pictorial and diagrammatic forms, including frequency histograms, cumulative frequency graphs. Obtaining simple statistics from discrete and continuous data, including mean, median, mode, quartiles, range, interquartile range and percentiles. Calculating probabilities of simple events.