

Prior Learning Topics for Mathematics: Analysis and Approaches SL & HL

To prepare for the Mathematics: Analysis and Approaches SL and HL courses, it's important to have a solid understanding of certain foundational topics. Here is a list of prior learning topics for both SL and HL, with HL-specific topics marked separately:

Standard Level (SL) Topics:

Numbers and Algebra:

- Number systems: Natural numbers N ; Integers Z ; Rationals Q and Irrationals; real numbers R
- SI units for mass, time, length and their derived units, e.g. speed, area and volume
- Rounding, decimal approximations and significant numbers, including appreciation of errors
- Definition and elementary treatment of absolute value (modulus), $|a|$
- Use of addition, subtraction, multiplication and division using integers, decimals and fractions, including orders of operations
- Prime numbers, factors (divisors) and multiples
- Simple applications of ratio, percentage and proportion
- Manipulation of algebraic expressions, including factorization and expansion
- Rearranging formula
- Calculating numerical value of expressions by substitution
- Evaluating exponential expressions with simple positive exponents
- Use of inequalities, $<$, $>$, \leq , \geq , intervals on the real number line
- Simplification of simple expressions involving roots (surds or radicals)
- Expression of numbers in the form $a \times 10^k$, $1 \leq a < 10$, $k \in Z$
- Familiarity with commonly accepted world currencies
- Solution of linear equations and inequalities
- Solving systems of linear equations in two variables
- Concept and basic notation of sets. Operations on sets: union and intersection

Functions:

- Graphing linear and quadratic functions using technology
- Mapping of the elements of one set to another. Illustration by means of sets of ordered pairs, tables, diagrams and graphs

Geometry and Trigonometry:

- Angle measurement in degrees, compass directions
- The triangle sum theorem
- Pythagoras theorem and its converse

- Midpoint of a line segment and the distance between two points in the Cartesian plane
- Geometric concepts: point, line, plane, angle
- Right-angle trigonometry, including simple applications for solving triangles
- Three-figure bearings
- Simple geometric transformations: translation, reflection, rotation, enlargement
- The circle, its centre and radius, area and circumference. The terms diameter, arc, sector, chord, tangent and segment
- Perimeter and area of plane figures. Properties of triangles and quadrilaterals, including parallelograms, rhombuses, rectangles, squares, kites and trapezoids; compound shapes
- Familiarity with three-dimensional shapes (prisms, pyramids spheres, cylinders and cones)
- Volumes and surface areas of cuboids, prisms, cylinders, and compound three-dimensional shapes

Statistics and Probability:

- The collection of data and its representation in bar charts, pie charts, pictograms, and line graphs
- Obtaining simple statistics from discrete data, including mean, median, mode, range
- Calculating probabilities of simple events
- Venn diagrams for sorting data, Tree diagrams

Calculus:

- $Speed = \frac{Distance}{Time}$

Higher Level (HL) Prior Learning Topics (in addition to SL topics):

Numbers and Algebra:

- Greatest common factor (divisor) and least common multiples
- Evaluating exponential expressions with rational exponents
- Rationalising the denominator
- Solution of quadratic equations and inequalities with rational coefficients
- Addition and subtraction of algebraic fractions