

Villiers School – IBDP Subject Brief

Group 5 – Mathematics

Mathematics – Applications & Interpretations (SL)



Description and Aims

This course recognises the increasing role that Mathematics and technology play in a diverse range of fields in a data rich world. As such, it emphasises the meaning of Mathematics in context by focusing on topics that are often used as applications or in mathematical modelling. Mathematics: Applications and Interpretations will develop mathematical thinking, often in the context of a practical problem and will use technology to justify conjectures.

- Develop a curiosity and enjoyment of Mathematics and appreciate its' elegance & power
- Develop an understanding of the concepts, principles and nature of Mathematics
- Communicate mathematics clearly, concisely and confidently in a variety of contexts
- Develop logical and creative thinking and patience and persistence in problem solving to instil confidence in using Mathematics
- Employ and refine their powers of abstraction and generalization
- Take action to apply and transfer skills to alternative situations to other areas of knowledge and to future developments in their local and global communities
- Appreciate how developments in technology and Mathematics influence each other
- Appreciate the moral, social and ethical questions arising from the work of mathematicians and the applications of Mathematics
- Appreciate the universality of Mathematics and its' multicultural, international and historical perspectives
- Appreciate the contribution of Mathematics to other disciplines and as a particular "area of knowledge" in the TOK course
- Develop the ability to reflect critically upon their own work and the work of others
- Independently and collaboratively extend their understanding of Mathematics

Course outline

Number and Algebra - 16 teaching hours

Functions - 31 teaching hours

Geometry and Trigonometry - 18 teaching hours

Statistics and Probability - 36 teaching hours

Calculus - 19 teaching hours

The "toolkit" and Mathematical exploration - 30 teaching hours



External Assessment

Paper 1 (90 minutes) - Technology required.

Compulsory short response questions based on the syllabus (80 marks)

Weighting 40%

Paper 2 (90 minutes) - Technology required.

Compulsory extended response questions based on the syllabus (80 marks)

Weighting 40%

Internal Assessment

Internal Assessment in mathematics is an individual exploration. This is a piece of written work that involves investigating an area of Mathematics approximately 12-20 pages long. (20 marks)

This component is internally assessed by the teacher and externally moderated by the IB at the end of the course. Weighting 20%

Prior knowledge*

Topic 1: Numbers and Algebra Number systems: N, Z, Q, R

- Système International (SI) units for mass, time, length and their derived units e.g. speed, area and volume
- Rounding, decimal approximations and significant figures including appreciation of errors
- Definition and elementary treatment of absolute value $|a|$
- Use of addition, subtraction, multiplication and division using integers, decimal and fractions, including order of operations
- Prime numbers, factors and multiples
- Simple applications of ratio, percentage and proportion
- Manipulation of algebraic expressions, including factorisation and expansion
- Rearranging formulae
- Calculating the numerical value of expressions by substitution
- Use of inequalities and intervals on the real number line.
- Expression of numbers in scientific notation
- Familiarity with commonly accepted world currencies
- Solution of linear equations and inequalities
- Solution of quadratic equation
- Solving systems of linear equations in two variables
- Concept and basic notation of sets. Operations on sets: union and intersection

Topic 2: Functions Graphing linear and quadratic functions using technology

- Mapping of elements of one set to another. Illustration by means of sets of ordered pairs tables, diagrams and graphs



Topic 3: Geometry and Trigonometry Pythagoras Theorem and its converse

- Mid point of a line segment and distance between two points on a Cartesian plane
- Geometric concepts: point, line, plane, angle
- Angle measurement in degrees, compass directions
- The triangle sum theorem
- 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, segment
- Perimeter and area of plane figures. Properties of triangles, quadrilaterals, parallelograms, rhombi, rectangles, squares, kites and trapezoids; compound shapes
- Familiarity with 3-D shapes (prisms, pyramids, spheres, cylinders, cones)
- Volumes and surface areas of cuboids, prisms cylinders and compound 3-D shapes

Topic 4: Statistics and Probability The collection of data and its representation in bar charts, pie charts, micrograms and line graphs

- Obtaining simple statistics from discrete data including mean, mode, median, range
- Calculating probabilities of simple events
- Venn diagrams for sorting data
- Three diagrams

Topic 5: Calculus

- $\text{Speed} = \text{Distance}/\text{Time}$

**Level testing in Mathematics is a requirement within the application process.*

For suitable candidates, Mathematics: Applications & Interpretations is available at Higher Level through Pamoja Education (additional fee).