IB Mathematical Studies
Grades 9 - 12

Standard 1: The student uses a variety of strategies in the problem-solving process.

1.1 Use of geometric series in compound interest problems

1.2 Application and use of logic in electric circuits

1.3 Geometric representations of vector sums, difference, and products

1.4 Recognize Venn diagrams, tree diagrams and probability formulae as equivalent organizational structures

1.5 Use of graphical methods to solve problems

1.6 Applications of the normal distribution

Standard 2: The student understands and applies basic and advanced properties of the concepts of numbers.

2.1 The real number system

2.2 Expressing numbers in scientific notation

2.3 Operations with numbers expressed in scientific notation

Standard 3: The student uses basic and advanced procedures while performing the process of computation and estimation.

3.1 Ability to recognize whether the results of calculations are reasonable

3.2 Awareness of the errors resulting from rounding

3.3 Use of significant figures

Standard 4: The student understands and applies the basic and advanced properties of patterns, function and algebra.

Function:

4.1 Concept of a function; mapping, domain, range

4.2 Linear functions and their graphs

4.3 Piecewise linear functions: continuous and step

4.4 Linear inequalities and their graphs, including systems

4.5 Properties of the graph of the quadratic equation

4.6 Graphs and properties of the sine and cosine functions (i.e., symmetry, vertex, intercepts)

4.7 Graphs and properties of the exponential function; use with problems involving growth and decay

4.8 Basic concepts of asymptotic behavior

Algebra:

4.9 Finding terms and sums of arithmetic and geometric sequences and series

4.10 Solution of inequalities in one variable

4.11 Solution of linear equations

4.12 Graphing of inequalities in one or two variables

4.13 Solution of quadratic equations by factoring and by graphing; excluding knowledge of the quadratic formula

Finance:

4.14 Linear programming

4.15 Currency transactions including conversion and commission

4.16 Simple and compound interest, including the use of iterative methods to find the time period

4.17 Construct and use tables (e.g., loan and repayment schemes, investment and savings schemes, inflation)

4.18 Use of a financial spreadsheet

Standard 5: The student understands and applies basic and advanced concepts of statistics and data analysis.

5.1 Distinguish between discrete and continuous data

5.2 Scatter-plots, including line-of-best-fit by eye

5.3 Qualitative understanding of correlation

5.4 Frequency tables, polygons, and histograms for simple discrete data

5.5 Grouped discrete or continuous data: frequency tables and histograms, frequency density histograms, mid-interval values, interval width, upper and lower boundaries

5.6 Cumulative frequency tables for grouped discrete and grouped continuous data

5.7 Cumulative frequency curves

5.8 Percentiles and quartiles

5.9 Measures of central tendency (i.e., mean, median, and mode)

5.10 Measures of dispersion (i.e., range, interquartile range, standard deviation)

5.11 Use and properties of the normal curve

5.12 The standard normal distribution, standardized scores and use of normal tables

5.13 Bivariate data product-moment correlation coefficient

5.14 Interpretation of positive, negative and zero correlation

5.15 The regression line and its use for prediction purposes

5.16 The Chi-Square test for independence and for goodness of fit of the normal distribution

5.17 Formulation of null and alternative hypotheses

5.18 One-tailed and two-tailed tests

5.19 Test levels – 5% and 1%

5.20 Contingency tables

5.21 Calculation of expected frequencies

5.22 Degrees of freedom

Standard 6: The student understands and applies basic and advanced concepts of probability.

6.1 Concept of population versus sample

6.2 Probability of an event, a complementary event, combined events, mutually exclusive events and independent event

6.3 Conditional probability

6.4 Use of Venn diagrams, tree diagrams, and tables of outcomes to calculate probability

6.5 Solution of problems using “with replacement” and “without replacement”

Standard 7: The student understands and applies basic and advanced properties of the concepts of geometry.

Geometry:

7.1 Coordinates in two and three dimensions

7.2 Distance between points

7.3 Equation of a line, equations of parallel and perpendicular lines

7.4 Gradient and intercepts of a line

7.5 Intersections of lines

7.6 Geometry of cuboids, right prisms, and square-based pyramids

7.7 Representation and geometry of a vector in tow dimensions as a displacement, including the zero vector

7.8 Operations with vectors (e.g., vector sum, difference, multiplication by a scalar)

7.9 Magnitude of a vector

7.10 Representing a point of the Cartesian plane as a vector

7.11 Applications of vectors to simple geometric figures

Trigonometry:

7.12 Laws of Sine and Cosine, including the ambiguous case, excluding radian measure

7.13 Area of a Triangle

7.14 Finding the angle between two lines and between a line and a plane in a 3-D solid

Standard 9: The student understands and applies basic and advanced properties of the structure of mathematics.

9.1 Basic concepts of set theory (i.e., subsets, intersection, union, complement)

9.2 Simple applications of Venn diagrams

9.3 Basic concepts of symbolic logic

9.4 Propositional notation

9.5 Compound statements (e.g., implication, negation, union and intersection)

9.6 Translation between verbal statements, symbolic form and Venn diagrams

9.7 Definitions of implication, converse, inverse and contrapositive

9.8 Logical equivalence

9.9 Use of truth tables to provide proofs, using at most three propositions, and to test the validity of simple arguments

9.10 Concepts of contradiction and tautology