

REQUIREMENTS FOR CANDIDATES TO IB1 MATHEMATICS

The purpose of the entrance exam is to check to what extent the candidate has mastered the school material from primary school and 9th and 10th grades, as well as additional information about the candidates' mathematical and logical skills.

The exam will include:

- knowledge and understanding: number skills, selecting and applying effectively mathematics to solve problems, checking results;
- investigating patterns, seeing connections and dependencies: applying reasoning, content analysis, giving arguments, noticing analogies, formulating applications, generalizing;
- communicating: using appropriate mathematical language to describe reasoning and obtained results, interpreting and creating mathematical data, representing data graphically, using different forms of representation when communicating mathematical ideas, reasoning and findings;
- applying mathematics in real-life context: selecting the best model to describe and solve the given problem, draw valid conclusions, reflect upon their results.

Detailed requirements:

1) Number and algebra:

- number systems: natural numbers, integers, rationals and irrationals, real numbers,
- operations on numbers,
- absolute value,
- prime numbers, factors, multiples GCD, LCF,
- working with percentages,
- powers and roots, laws of operations on powers and roots,
- ratios, rates, scale,
- rounding numbers (significant figures concept), approximation and estimation, errors
- conversion of units: time, speed, distance, length, mass,
- units of areas and volume,
- algebraic expressions, factorization and expansion,
- calculating the numerical value of the expression by substitution,
- exponential expressions, logarithms,

- working with algebraic fractions,
- rearranging formulae,
- rationalizing the denominator,
- scientific notation,
- number sequence: arithmetic and geometric,
- financial mathematics: simple/compound interests, depreciation, loans, world currencies, sequences in finance,
- linear and quadratic equations and inequalities, quadratic formula,
- systems of linear equations
- perfect squares formulas: square of a sum, square of a difference, difference of squares,
- sets, operations on sets: union, intersection, Venn diagrams.

2) Functions:

- relations and functions, domain and range, sign diagrams, transformations of graphs, absolute value function, composite functions, inverse functions,
- linear and quadratic functions,
- polynomials,
- exponentials and logarithmic functions.

3) Geometry and trigonometry:

- Pythagoras' theorem and its converse, triangles 45, 45, 90 and 30, 60, 90,
- right-angle trigonometry, solving triangles,
- non-right angle trigonometry, area of a triangle, sine and cosine rules,
- angle of elevation, angle of depression, true bearings,
- midpoint of a line segment, distance between two points in a Cartesian plane, gradient, parallel and perpendicular lines,
- equation of a line, perpendicular bisector, Voronoi diagram,
- translation, reflection, rotation, enlargement,
- simple geometric proofs, congruent and similar triangles,
- regular polygons, especially regular hexagon,
- properties and formulas for the perimeters and areas of flat figures: square, rectangle, rhombus, parallelogram, trapezoid,
- circle, circumference of a circle and area of a circle, the number π , length of an arc, area of a sector, area and perimeter of a segment,

- circle theorems: tangents from an external point theorem, angle between a tangent and a chord theorem, angle at the center theorem, angles subtended by the same arc theorem,
- cyclic quadrilaterals, regular polygons,
- cube, cuboid: volume, surface area, diagonals,
- prisms and pyramids, cylinders: volumes and surface areas in tasks of low difficulty,
- prisms and pyramids in a realistic context, e.g. packing books or frames in a box.

4) Statistics and probability:

- interpretation and creation of tables, bar and pie charts, charts in the coordinate system,
- simple statistics from discrete data: mean, mode, median, range, quartiles, interquartile range,
- calculating the probability of simple events,
- Venn and tree diagrams,
- independent events,
- conditional probability,
- expectation
- bivariate statistics: scatter graphs, correlation, line of best fit by eye, linear regression.