

FOUNDATION YEAR MATHEMATICS

WINTER TERM (60h)

- Types of numbers. Order of algebraic operations. Correct use of brackets.
- Fractions, decimals and algebraic operations on them.
- Elementary algebraic identities (square of a sum/difference, difference of squares, sum/difference of cubes, root of a square).
- Elementary set theory: open/closed intervals, finite/infinite set, notation, operations on sets.
- Quantifiers. Elementary mathematical logic.
- Units.
- Basic planar sets and solids - areas, volumes, properties.

- Coordinate system.
- Distance on the plane and in the space.
- Vectors.
- The simplest lines and curves ($x=a$, $y=a$, circles).
- Non-vertical lines.
- Parallel and perpendicular lines.
- Lines and curves intersection (roots of a quadratic equation).
- Distance from a point to a line.

- Functions: domain, counter-domain, range, properties (one-to-one, onto, monotone), inverse function, composition of functions.
- Operations on graphs: scaling, shifting.
- Functions given by a multipart formula ('cases').
- Absolute value function.
- Linear functions.
- Quadratic functions: completing the square, roots, properties, graphs, extreme values.

SUMMER TERM (60h)

- Polynomials - division, roots, Bezout theorem, factorization, graphs.
- Rational functions.
- Polynomials and rational functions - equations and inequalities.
- Equations and inequalities with an absolute value.
- Systems of equations.

- Operations on powers - revision.
- Exponential functions - graphs and properties.
- Exponential modeling, compound interest problem, number e , hyperbolic functions.
- Logarithms - definition and properties.
- Logarithmic functions - graphs and properties.
- Exponential and logarithmic equations and inequalities.
- Operations on graphs.

- Measuring an angle. Types of angles. Angles in the coordinate system.
- Trigonometric functions of right angle triangles. Geometric applications.
- Trigonometric functions on $[0, 2\pi]$ - definition, signs in all quadrants, reduction identities, graphs in $[0, 2\pi]$, slope as a tangent.
- Polar coordinates.
- Trigonometric identities
- General trigonometric functions - graphs, domains, ranges, properties.
- Trigonometric equations and inequalities.
- Cyclometric functions