

OUR MATHEMATICS CURRICULUM

Italy

(students 14-18 years old)

First and second year (from 14 to 15 years old) 4h/week	Numbers	<ul style="list-style-type: none">• order positive and negative integers, decimals and fractions; use the number line as a model for ordering of the real numbers; use the symbols =, ≠, <, >, ≤, ≥• use the four operations• use integer powers and associated real roots• interpret and compare numbers in standard form $A \times 10^n$ $1 \leq A < 10$, where n is a positive or negative integer or zero• interpret fractions and percentages as operators
	Ratio, proportion and rates of change	<ul style="list-style-type: none">• solve problems involving percentage change• solve problems involving direct and inverse proportion• use scale factors, scale diagrams and maps
	Algebra	<ul style="list-style-type: none">• use and interpret algebraic notation• brackets• substitute numerical values into formulae and expressions, including scientific formulae• use algebraic methods to solve linear equations in one variable

		<ul style="list-style-type: none"> • Definition of a function. Domain and range of a function. • Recognise, sketch and produce graphs of linear and quadratic functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane • reduce a given linear equation in two variables to the standard form $y = mx + c$; calculate and interpret gradients and intercepts of graphs of such linear equations numerically, graphically and algebraically • simultaneous linear and quadratic equations • solve linear inequalities in one or two variables {and quadratic inequalities in one variable}; represent the solution set on a number line, {using set notation and on a graph} • transformation of functions
	Statistics	<ul style="list-style-type: none"> • construct and interpret appropriate tables, charts, and diagrams • mean, mode, median, range, variance, standard deviation
	Probability	<ul style="list-style-type: none"> • enumerate sets and unions/intersections of sets systematically • calculate the probability of

		independent and dependent combined events
	Geometry	<ul style="list-style-type: none"> interpret and use fractional and negative scale factors for enlargements rotations, reflections and translations identify and apply circle definitions concepts of congruence and similarity, including the relationships between lengths, areas and volumes in similar figures apply Pythagoras' Theorem apply Euclid's Theorems
Third, fourth and fifth year (from 16 to 18 years old) 3h/week (3rd, 5th yr) 4h/week (4th yr)	Exponential functions and Logarithms	<ul style="list-style-type: none"> $y=a^x$ and its graph. $\log_a x + \log_a y = \log_a(xy)$ $\log_a x - \log_a y = \log_a(x/y)$ $k \log_a x = \log_a x^k$ <ul style="list-style-type: none"> The equivalence of $y=a^x$ and $x = \log_a y$ Use of a calculator logarithm function to solve for example $5^{3x} = 2$
	Polar Coordinates	<ul style="list-style-type: none"> Relationship between polar and Cartesian coordinates
	Trigonometry	<ul style="list-style-type: none"> Sine, Cosine and tangent of any angle Use the sine, cosine and tangent ratios to find angles and sides in right-angled triangles Sine e cosine rules Trigonometric ratios
	The conic sections	<ul style="list-style-type: none"> circle, parabola, ellipse, hyperbola, the equation $ax^2+by^2+cx+dy+e=0$

Calculus

- Limit of a function
- Differentiation of a^x , $\ln x$, $\sin x$, $\cos x$, $\tan x$, and linear combinations of these functions.
- Product rule, quotient rule
- Chain rule
- Integration by inspection
- Integration by substitution (simple cases only)
- Integration by part
- Differential equations:
The concept of a differential equation and its order.
(to include only variables which are separable)
- Calculation of the arc length of a curve and the area of a surface of revolution using Cartesian or parametric coordinates.
- Volumes of revolution