MATHEMATICS TOPICS AND CONTENTS

Topic	Contents
Numbers	Routine use of addition, subtraction, multiplication and division, using integers, decimals and fractions, including order in operations. Integer exponents. Laws of exponents. Square and cubic roots. Expression of numbers in standard form (scientific notation). Simplification of expressions involving roots, including rationalizing the denominator. Divisibility rules for 2, 5, 10, 3 and 9. Prime numbers. Composite numbers, factors, including greatest common factors and least common multiples. Definition of absolute value (modulus). Applications of ratio, percentage and proportion, linked to similarity. Compound interest. Rounding decimal approximations.
Sets and numbers	Number systems: natural numbers, integers, rational and irrational numbers, real numbers. Intervals on the real number line using inequalities.
Algebra	Basic manipulation of simple algebraic expressions involving factorization, expansion and completing the square. Formulae: $a^2 - b^2 = (a + b)(a - b)$ $(a \pm b)^2 = a^2 \pm 2ab + b^2$. Rearrangement, evaluation and combination of simple formulae, simplifying. Addition, subtraction, multiplication, division and simplifying algebraic fractions. Solutions of linear, quadratic, rational equations and inequalities in one variable. Discriminant. Linear and quadratic equations with parameters. Solution of simultaneous equations in two variables with linear equations or with one quadratic equation. Solution of system of linear inequalities.
Cartesian plane and functions	Distance between two points in the Cartesian plane. Coordinates of midpoint of a line segment. The linear function and its graph, gradient and y-intercept. The quadratic function, its graph, coordinates of vertex, properties. Maximum and/or minimum values of quadratic function in the given interval. Domain and range of linear and quadratic functions.
Geometry	Triangle. Properties of equilateral and isosceles triangles. Pythagoras' theorem and its converse. Equal and similar triangles. Similar plane figures. Ratio of their perimeters and areas. Quadrilaterals: parallelograms, rhombuses, rectangles, squares and

	trapeziums; compound shapes. Their properties, perimeters and areas. Properties of midline of triangle and of trapezium. The circle, its centre and radius, area and circumference. Length of arc, area of sector. Chord, tangent and segment, properties of the tangent. Parallel and perpendicular straight lines, angle between straight lines in three dimensional shapes. Cube, rectangular, prism. Their surface area and volume. Regular pyramid. Its surface area and volume. Volume and surface area of revolutions: cone and cylinder.
Trigonometry	Right-angle trigonometry. Pythagorean identity. Solution of right triangles.
Probability and statistics	Counting principles, additional and multiplication rules. Probability of event. Descriptive statistics: collection of raw data, display of data in pictorial and diagrammatic forms, frequency table. Obtaining simple statistics from discrete data, including mean, median and mode.