Satit Prasarnmit
International Programme

Curriculum Pathways

Mathematics Department

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Curriculum Pathway

Academic Year 2025-2026

Department: Mathematics

Department Details	Assessment Types
Subject: Mathematics **Head of Department: James Denman** **Head of Department Email: james.de@spip.in.th** **Subject Teachers: James Denman, Pooja Kumar, Tafail Hussain, Ardra Asok, Mohammed Nisar Shah, Aidan Williams**	**Assessment Type 1: Class Assignments** **Assessment Type 2: Unit Tests** **Assessment Type 3: Homework @ (www.myimaths)/worksheets** **Assessment Type 4: End of Term Exams** **Assessment Type 5: End of Year Exam.**

Year	Term	Unit(s) of Work	Core Knowledge & Concepts
7	1	Numbers Algebra Measurement Geometry Data	• Numbers: Place value, integers, decimals, rounding, order of operations, multiples and factors, divisibility tests, squares and square roots, fractions, equivalence of fractions and decimals, finding percentages of amounts • Algebra: Simplifying expressions, expanding brackets • Measure and geometry: Polygons, Congruency, Parts of a circle, solid shapes, 3D shapes, lines and angles, types and properties of triangles and quadrilaterals, constructions, length, mass, capacity • Data: Recognising different types of data, collecting data, calculating averages and range
	2	Numbers Algebra Measurement Geometry Data	• Numbers: Multiplying and dividing by power of 10, Rounding, Fractions-Decimals-Percentages, Percentage of amount, Comparing decimals and fractions, Calculations with decimals • Algebra: Substitution, formulae, solving 1-step and 2-step equations, sequences, functions, graphs of linear functions • Measure and geometry: Relationship between angles in parallel lines, quadrilaterals & triangles, coordinates • Data: Pictograms, bar charts, pie charts, frequency diagrams for grouped discrete data, using statistics
	3	Numbers Algebra Measurement Geometry Data	• Numbers: Simplifying ratios, dividing a quantity in a given ratio, Proportion, Comparing using ratios • Algebra: Solving ratio and proportion problems by using equations • Measure and geometry: Symmetry, transformations (reflection, translation, rotation), areas of rectangles, perimeters of rectangles, compound shapes, volume of cuboids, surface area • Data: Language of probability, experimental probability, theoretical probability
8	1	Number Algebra Measurement Geometry Data	• Number: arithmetic operations with integers; indices; multiples and factors; mental strategies; rounding numbers; ordering, multiplying, dividing decimals; addition, subtraction, multiplication, division of fractions; using laws of arithmetic to simplify calculations; • Algebra: constructing, simplifying, expanding expressions; simple functions;Inequalities, Changing subject of a formula • Geometry and measure: construction;bearings; congruency; symmetry; units of measure; units of area and volume; estimation; imperial units; • Data: discrete and continuous data; two-way tables; frequency tables; averages and ranges;
	2	Number Algebra Measurement Geometry Data	• Number: Ordering decimals, adding and subtracting integers and decimals, multiplying and dividing decimals, writing fractions as decimals, sequences , nth term • Algebra: constructing, simplifying, expanding expressions; simple functions; • Geometry and measure: Plotting points, interpreting real-life graphs, drawing graphs, Geometry problems using coordinate axes; • Data: Frequency diagrams and pie charts for discrete data, line graphs, histograms
	3	Number Algebra Measurement and Geometry	• Number: Ordering decimals, adding and subtracting integers and decimals, multiplying and dividing decimals, writing fractions as decimals • Algebra: constructing, simplifying, expanding expressions; simple functions; • Geometry and measure: Plotting points, interpreting real-life graphs, drawing graphs,linear graphs

		Statistics	Translation, rotation, symmetry ● Statistics: Probability rules, combined events
9	1	Number Algebra Geometry Data	● Number: Irrational numbers, Estimating Surds, Index Laws (including Negatives), Standard form, lower & upper bounds, multiplying & dividing by a power of 10. ● Algebra: Constructing Expressions, Laws of indices, Changing the subject of a formula, expanding & simplifying brackets, substitution, adding & subtracting algebraic fractions. ● Geometry: reflective symmetry in 3D shapes, constructions, maps and scale drawings, bearings. Area & Circumference of circle including compound shapes. Pythagoras Theorem, Surface area & volumes of prisms & cylinders. Converting between smaller & larger measurements. ● Data: planning and collecting data, averages & ranges from grouped data, biased data.
	2	Number Algebra Measurement Geometry Data	● Number: Multiplying & dividing fractions, recurring decimals and terminating decimals. ● Algebra: solving linear equations, constructing and solving equations, linear inequalities, simultaneous equations, linear graphs ● Measurement: Compound measures, real life graphs ● Geometry: properties of angles, interior & exterior angles in polygons, angles in triangles, quadrilaterals, & circles, angles in parallel lines, tessellations, loci ● Data: Frequency polygons, stem & leaf diagrams, scatter graphs & correlation, selecting correct statistical graphs.
	3	Number Algebra Geometry Data	● Number: ratio and proportion, compound percentages, multiplying & dividing decimals, percentage multipliers, percentage change. ● Algebra: functions & inverse functions, linear & quadratic sequences, quadratic expressions, solving simultaneous equations graphically. Speed, distance & time graphs. ● Geometry: transformations including translations rotations reflections and enlargements, ● Data: probability and successive events, relative frequency and probability, tree diagrams,
10 IGCSE	1	Numbers Algebra Geometry Data Probability	● Numbers: Students revise key numerical skills, Multiples & factors, prime numbers, order of operations, rounding numbers, powers and roots. Equivalent fractions, percentages, standard form. ● Algebra 1: Students revise key algebraic skills. Substitution, Simplifying expressions, working with brackets, laws of indices. Solving linear equations, factorising algebraic expressions, rearrangement of a formula, expansion of brackets. ● Geometry: Students revise key angle knowledge: Quadrilaterals, triangles, interior & exterior angles, properties of a circle, construction. Surface area & volume of 3D shapes, area & perimeter of a sector of a circle. ● Data: Students collect different types of data, organise data using tally tables, frequency tables, stem and leaf diagrams & two way tables. Draw pictograms, bar graphs & pie charts to display data. ● Probability: Theoretical probability, probability of an event happening. Combination of independent & mutually exclusive events.
	2	Number Algebra Geometry Data	● Number: Sequences, rational & irrational numbers, ● Algebra: Plotting straight lines, understanding y = mx + c, finding the midpoint of a line. Expanding double brackets, factorising quadratics, solving quadratics. ● Geometry: Pythagoras' Theorem, understanding similar shapes, understanding congruent shapes. ● Data: Averages, comparisons, calculating averages & ranges for frequency data. Calculating averages & ranges for grouped continuous data. Percentiles & quartiles. Box-and-whiskers plots.
	3	Measurement Algebra Geometry	● Measurement: Understanding units, time, upper & lower bounds, conversion graphs, money conversions. Converting from cm to km, converting measurements in 3 dimensions. ● Algebra: Solving simultaneous equations, linear equalities, completing the square, quadratic formula, factorising quadratics when a > 1. Algebraic fractions. ● Geometry: Scale drawings & bearings. Trigonometry functions (tangent, cosine & sine ratios). Solving problems using trigonometry. The sine & cosine rules. Trigonometry in 3 dimensions.
10 IGCSE Additional Maths	1	Trigonometry Sets, Vectors, Functions and Transformations Statistics	● Trigonometry: Students revise the trigonometry of right-angled triangles (SOHCAHTOA) before learning how sin, cos, and tan are extended beyond acute angles. Students learn to use the sine and cosine rules for general triangles. ● SVFT: Students learn set notation and how to solve logic problems. Vector algebra is covered alongside the relationship between vectors/matrices and transformations. Students learn how to combine and inverse functions. ● Statistics: Students learn how to present data in scatter graphs, box-and-whisker plots, and cumulative frequency graphs. Mean, median, and mode are contrasted as methods for measuring the average.
	2	Algebra Indices and Surds Factors and Polynomials Straight Line Graphs	● Algebra: Students will learn graphical and algebraic analysis of quadratic functions and then extend this knowledge to study the foundation of pure mathematics i.e. functions. ● Indices and surds: students learn to simplify and solve equations involving surds and and indices. Rationalising, multiplication and division of surds. ● Factors and Polynomials: Adding, subtracting, multiplying and dividing polynomials. The factor theorem, remainder theorem and cubic expressions and higher. ● Straight line graphs: Problems involving the midpoint of a line, parallel and perpendicular lines and their equations, converting from non-linear to linear equations and linear to non-linear equations.
	3	Circular Measure Permutations and	● Circulur measure: Circular measure, length of an arc, area of a sector ● Permutations and combinations: factorials, arrangements, permutations, combinations ● Series: Pascal's triangle, the binomial theorem, arithmetic progressions, geometric progressions,

		Combinations Series	infinite geometric series, further series.
11 **IGCSE**	1	Trigonometry Sets, Vectors, Functions and Transformations Statistics	● Trigonometry: Students revise the trigonometry of right-angled triangles (SOHCAHTOA) before learning how sin, cos, and tan are extended beyond acute angles. Students learn to use the sine and cosine rules for general triangles. ● SVFT: Students learn set notation and how to solve logic problems. Vector algebra is covered alongside the relationship between vectors/matrices and transformations. Students learn how to combine and inverse functions. ● Statistics: Students learn how to present data in scatter graphs, box-and-whisker plots, and cumulative frequency graphs. Mean, median, and mode are contrasted as methods for measuring the average.
	2	Probability Revision	● Probability: Students learn to calculate the probability of simple and combined events, and will know when two or more events are exclusive or independent. Students will also learn how probability can be represented as a Venn diagram using the set notation covered earlier in the term. Conditional probability is also introduced. ● All material has been covered at this point. Students concentrate on revision and development of good exam practices and techniques.
	3	Study Leave	● Students are engaged in self-study during the exam period.
12 **AS Level**	1	Pure Mathematics 1: Quadratics, Functions, Coordinate Geometry, Circular Measure, Trigonometry Probability & Statistics 1: Data Representation, Central Tendencies & Variation, Discrete & Continuous Distributions.	● Students will learn graphical and algebraic analysis of quadratic functions and then extend this knowledge to study the foundation of pure mathematics i.e. functions. ● Students will practice coordinate geometry focussing mainly on straight lines and circles. ● Students will learn the connection between different angle measures, particularly the 'natural angle' measure, radians. Then they will apply this when learning advanced trigonometry, trigonometric identities, and equations. ● Students recap the basics of statistics - data representation and analysis, measures of central tendency, and measures of range. ● Students will practice the basic rules of probability for mutually exclusive and independent events, and then extend this to conditional probabilities.
	2	Pure Mathematics 1: Series and Calculus Probability & Statistics 1: Permutations and Combinations, Discrete & Continuous Distributions.	● Students will learn the origins of calculus, interpreting derivatives as gradient functions. They will then learn the tools of calculus - algebra of derivatives, applications of derivatives, integration as antiderivative, and applications of integration such as calculating area under the curve. ● In permutations and combinations, students will learn how to calculate the number of ways to select and arrange objects, including the special case where some objects are identical. ● Students will learn how to interpret and use discrete probability distributions like the geometric and binomial distributions, and then the continuous (normal or Gaussian) probability distribution.
	3	Revision and exam preparations (Foundation Course) Pure Mathematics 2 & 3: Algebra, Logarithmic - exponential functions	● Students will have study leave for their external CIE exams. ● Students develop their algebra skills, learning about modulus functions, remainder and factor theorems, partial fractions and the binomial expansion. ● Students will learn the basics of exponential and logarithmic functions, laws of logarithms and exponents, solving exponential and logarithmic equations, including simultaneous equations.
13 **A Level**	1	Pure Mathematics 2 & 3: Trigonometry, Calculus, Vectors Mechanics: Velocity and Acceleration, Forces, Friction, Momentum	● Students progress to advanced trigonometry building on what they have learnt in Y12. They will be able to apply the half and double angle formulae, advanced trigonometric identities, and solve extended trigonometric equations. ● Students will further their knowledge of calculus, learning how to use the product and quotient rules, and perform implicit and parametric differentiation. They will also be able to integrate trigonometric and exponential functions, along with utilising logarithmic differentiation. ● In the vectors topic students will learn about vector products and vector equations of a line. ● Students will review the fundamental concepts of scalar and vector quantities, and interpreting and drawing distance-time and velocity-time graphs. ● Students will then learn about Newton's Laws of Motion and how to apply them to point-mass objects, as well as learning the properties of some special forces such as weight and the normal contact force. Further, students will be able to combine forces and resolve forces into components. ● Students will apply conservation of linear momentum to problems involving the collision of two particles

	2	Pure Mathematics 2 & 3: Differential Equations and Complex Numbers Mechanics: Work-Energy-Power, Work-Energy Principle	● Students will also learn how to solve differential equations of two variables by using the variable separation method. ● Finally, students will learn how to extend the real number line to include complex numbers. They will learn about the different components of complex numbers, the complex plane and solving equations using complex variables. ● Students learn about the relations between work and energy and its practical usage in solving mechanics problems. ● Conservation of energy is a powerful problem-solving technique that students will learn when and how to apply.
	3	Revision and exam preparations	● Students will have study leave for their external CIE exams.

Curriculum Pathway

Academic Year 2025-2026

Department: Mathematics

Department Details	Assessment Types
Subject: Thinking Skills **Head of Department: James Denman** **Head of Department Email: james.de@spip.in.th** **Subject Teacher(s): Radek Dobias**	**Assessment Type 1: Tests** **Assessment Type 2: Assignments** **Assessment Type 3: Formative Assessment**

Year	Term	Unit/s of Work	Core Knowledge & Concepts
12	1 Problem Solving	Relevant Selection Problems Finding a Procedure Problems Identifying a Similarity Problems	● Taking full responsibility for understanding and solving a problem. ● Representing the problem in a simplified or structured way (e.g., diagrams, equations, or physical models) to make it easier to solve. ● Organizing data or details clearly using tables, charts, diagrams, or well-structured text to support problem-solving. ● Breaking the problem into manageable steps and applying appropriate methods to find a solution. ● Using the Cambridge Thinking Skills method '2358', which involves structured thinking through categorization, systematic analysis, and logical steps. ● Using visual representations (e.g., flow charts, tree diagrams, mind maps) to clarify relationships between elements of the problem. ● Listing possibilities in an organized way to ensure all potential solutions are considered. ● Testing different possibilities, learning from mistakes, and refining approaches to reach a correct answer. ● Understanding how input-output processes can be represented algebraically to model and solve problems. ● Recognizing or creating patterns in sequences and using them to predict future terms. ● Identifying specific cases that satisfy the conditions of a problem before generalizing. ● Using overlapping circles to represent sets and relationships between them. ● Ensuring the final response directly addresses the question asked, with clear justification. ● Understanding common ways questions are misunderstood and learning strategies to avoid these errors. ● Selecting the best approach for solving a problem and reviewing whether it was effective. ● Identifying mistakes that occur through carelessness or oversight rather than lack of understanding. ● Learning verification techniques such as reverse calculation, estimation, or alternative methods. ● Applying core cognitive skills—analysis, comparison, deduction, and inference—to tackle complex questions. ● Understanding and applying ratios, rates, and scaling to solve real-world problems. ● Working with units such as speed (distance per time) or density (mass per volume) and converting between them. ● Calculating mean, median, and mode and knowing when each is most appropriate. ● Applying formulas and reasoning to measure 2D and 3D shapes accurately. ● Approximating numbers to a required degree of accuracy while minimizing error. ● Expressing problem relationships using algebraic expressions or equations for clearer analysis. ● Developing general formulas to describe sequences and predict future values. ● Understanding number systems beyond base 10, including binary, and their applications in computing and problem-solving.
	2	Evaluating Evidence	● Assessing whether a source of information is reliable and can be trusted.

	Critical Thinking	Using Evidence Analyzing Reasoning Evaluating Reasoning Creating Arguments	• Judging whether a claim is plausible, reasonable, and consistent with what is known. • Checking whether evidence is supported by other independent sources and whether it is internally consistent. • Considering whether evidence or examples fairly represent the whole situation rather than a selective or biased sample. • Presenting data clearly and accurately using graphs, charts, or tables so that it can be interpreted correctly. • Applying critical skills to evaluate the strength, reliability, and quality of different forms of evidence. • Using evidence effectively to support claims, explanations, or conclusions. • Constructing clear explanations that are consistent with the available evidence. • Drawing reasonable inferences from given information while recognizing limits to what can be concluded. • Applying evaluation skills to ensure evidence is used logically and appropriately in supporting arguments. • Understanding what constitutes an argument, including its structure and purpose. • Identifying the main conclusion of an argument and distinguishing it from supporting reasons. • Recognizing additional elements that strengthen or weaken arguments, such as counterclaims, examples, or analogies. • Carrying out detailed analysis of arguments by breaking them down into their key components and relationships. • Identifying assumptions that are not explicitly stated but are necessary for the argument to hold. • Applying analytical skills systematically to examine the reasoning behind claims and arguments. • Recognizing common logical fallacies that weaken reasoning, such as false cause or circular arguments. • Identifying flaws in reasoning that reduce the strength or validity of an argument. • Evaluating the use of emotional, ethical, or authority-based appeals in arguments. • Pinpointing weaknesses in reasoning, including overgeneralization, bias, or lack of supporting evidence. • Applying critical skills to evaluate the overall strength and credibility of reasoning in arguments. • Constructing arguments that clearly support a conclusion with sound reasoning and evidence. • Linking multiple strands of reasoning together to create a cohesive and persuasive argument. • Strengthening arguments through additional elements such as counterarguments, examples, and supporting data. • Considering alternative perspectives and counter-positions to make an argument more balanced and robust. • Applying creative and critical skills to develop strong, well-structured arguments.

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