Mathematics

Course Description	The study of Mathematics enables students to apply their knowledge, skills and understanding to relevant real world situations. The four main areas of study are: • Number and Algebra • Geometry and Measure • Statistics • Mathematical processes and applications

Course Aims	For students moving from Year 6 to Year 7, all mathematical tasks are designed initially to suit individual needs and students are allowed to progress at their own pace. Special emphasis is laid on exploration of new ideas through investigations and projects. Students are also taught to increase their powers of mental calculation so that they are not dependent on calculators for simple numerical work. The transition to more formal work begins with emphasis on written description of mathematical work. Year 7-9 work in Mathematics is characterised by the gradual development of mathematical reasoning and more formal procedures, building on the understanding of patterns, structures and relationships gained at earlier stages. Students gain insight into the power of mathematics to solve problems through making and testing generalisations and hypothesis through short and extended tasks. The main emphases are on: • developing skills of mathematical reasoning • increasing fluency of computation • developing a competence with formal algebra • developing an understanding of 2D,3D shapes • handling data • estimation

Course Content (Major Concepts and Areas Covered)	<u>**Year 7**</u> **Number and Algebra** • Prime numbers, factors, multiples Algebra • Decimals and fractions (addition, subtraction, multiplication and division) • Directed numbers and BODMAS Estimates and rounding • Square numbers • Triangle numbers • Percentage, percentage increase and decrease • Ratio and proportion • Algebraic terms and expressions • Simplifying expressions • Substituting in the given formula • Solving simple linear equations • Word problems involving linear equations • Word problems on fractions, decimals, ratio, time, linear equations **Geometry and Measures** • Units of measure(metric system and conversion) • Length, perimeter and area of plane shapes. 3-D shapes-isometric drawings, plans and elevations • Nets of 3 D shapes • Surface area of cubes and cuboid • Angles: in a triangle, quadrilateral, parallel lines • Construction of triangles • Rotational symmetry and line symmetry **Mathematical processes and application** • Enquiry based tasks – using and applying mathematical concepts to solve problems <u>**Year 8**</u> **Review** • Review of decimals, fractions, directed numbers, factors and multiples • Prime factorization • H.C.F and L.C.M • Percentage increase and decrease • Division of decimals **Number and Algebra** • Division of fractions • Linear sequences (term to term rule and position to term rule)

• Expanding brackets (expand and simplify)
• Factorisation(by taking common) identities
• Use of index notation with algebra
• Solving equations (constructing and solving equation)
• Substituting into formula
• Change of subject
• Ratio and proportion (direct and inverse)
• Map scale and conversion
• Powers of ten
• Change of subject and solving word problems
• Graph from linear equations
• Gradient and intercept of a straight line
• Equation of a straight line

Geometry and Measures
• Parallel lines and angles in parallel lines
• Angles in triangles and quadrilateral
• Geometrical reasoning
• Geometrical properties of quadrilaterals
• Construction-perpendicular bisector and angle bisector
• Area of triangle, parallelogram, kite, rhombus and trapezium
• Volume of a cube and a cuboid
• Volume of a prism
• Construction of triangles
• Circle- parts of a circle, circumference and area

Data handling
• Probability- experimental and theoretical, complimentary events
• Interpretation of scatter graphs
• Mean, mode and median in a discrete data

Mathematical processes and applications
• Enquiry based tasks – using and applying mathematical concepts to solve problems

Year 9

Review
• Order of operation
• Fractions, decimals and percentage
• Ratio and proportion (direct and inverse)
• Mean median mode of raw and grouped data

Number and algebra

- Reverse percentage
- Simple and compound interest
- Inverse ratio
- Word problems on ratio
- Estimation and rounding off, standard form, significant figures
- Expansion and simplification of algebraic expressions
- Equations and inequalities
- Algebraic identities and formulae
- Change of subject of formula
- Linear and quadratic sequences
- Simultaneous equations (algebraic and graphical)
- Factorisation of linear and quadratic expressions
- Solving quadratic equations by factorisation
- Simultaneous equations (algebraic and graphical)
- Factorisation of linear and quadratic expressions
- Solving quadratic equations by factorisation

Geometry and Measures
- Review of basic geometry rules
- Polygons
- Area and perimeter of circle
- Sector area and arc length
- Volume and surface area of solid
- Locus
- Pythagoras theorem
- Congruent and similar triangles
- Trigonometry

Data handling
- Scatter graph and correlation
- cumulative frequency
- Quartiles and inter quartile range
- Mean, mode and median from grouped data
- Review of probability - tree diagrams

Mathematical processes and applications
- Enquiry based tasks – using and applying mathematical concepts to solve problems

Suggested Texts and Materials	**Textbook**: International Mathematics 1, 2 and 3 - Pearson **Additional books**: Framework Math Year 7, 8 and 9 - Oxford **Mathematical software** such as LOGO, Autograph **Resources**: A variety of sources are used to support/supplement the texts including past SAT papers and the internet **Homework**: Homework is set after each lesson and requires an average 20-25 minutes of daily work

Delivery and Methodology	Length of course: 3 years Number of hours taught per week: 4 A variety of teaching styles are used to cater to the different learning styles of students. A range of activities which involve individual work, group work, project work, investigations, to name a few, are used to deliver the curriculum. A big emphasis is placed on developing the critical thinking skills of students through carefully directed questions and investigation work. The Promethean Boards provide great opportunities to motivate students through interactive lessons.

Assessment Objectives (Specifications and Standards)	**AO1: Fluency development** *Candidates should be able to:* • consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots • select and use appropriate calculation strategies to solve increasingly complex problems • use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships • substitute values in expressions, rearrange and simplify expressions, and solve equations • move freely between different numerical, algebraic, graphical and diagrammatic representations [for example, equivalent fractions, fractions and decimals, and equations and graphs] • develop algebraic and graphical fluency, including understanding linear and simple quadratic functions • use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics.

AO2: Mathematical reasoning

Candidates should be able to:

• extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations

• extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically

• identify variables and express relations between variables algebraically and graphically

• make and test conjectures about patterns and relationships; look for proofs or counter-examples

• begin to reason deductively in geometry, number and algebra, including using geometrical constructions

• interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning

• explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally.

AO3: Solve problems

Candidates should be able to:

• develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems

• develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics

• begin to model situations mathematically and express the results using a range of formal mathematical representations

• select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems.

Scheme of Assessment (Evaluation of Student Performance)	Formative assessment will be carried out through a variety of tasks assigned by the teachers. Students will be set individual targets for development and improvement after formative assessments. Each term there will be summative assessments which will consist of a mental math test and written assessments covering the learning objectives studied that term. An investigation will be set in every semester and this will be marked against criteria discussed with students. Some of the widely used forms of assessments are:

1. Homework
2. Practical assignments
3. Charts/Models/Presentations/Research folders
4. Written tests
5. Practical tests
6. Oral test/Quiz

Approximate weighting of assessment objectives for qualification:
AO1: 50 %
AO2: 30 %
AO3: 20 %

Weighting of formative and summative assessments (Y7-9):

Formative (progressive) assessments:
Before midterm: 20%
After midterm: 20%
Midterm Examination: 30%
Final Examination: 30%

Grading Policy and Additional Expectations (if any)	All assessment is criterion referenced and aligned to learning objectives as outlined in the teacher's semester projections. Teachers mark work on the basis of mark schemes made in collaboration with colleagues of the same year group. Formative assessments may be given a mark, a grade or a comment. It values teacher judgement and informs the learner about strengths and areas of development. All summative assessments are graded on a scale as published in the whole school assessment policy. 90-100%: A* 80-89%: A 75-79%: B+ 70-74%: B 65-69%: C+ 60-64%: C 55-59%: D+ 50-54%: D 0-49%: F