Mathematics

Curriculum Intent	The maths curriculum at London Nautical School intends to prepare its pupils for the world beyond school and to be able to make a difference. Maths plays a vital role in all aspects of life, and many jobs, from trades to academia. We aspire for our students to be successful in maths so they have opportunities in higher education and beyond. Our curriculum is designed to give students a broad range of skills including problem solving, logical reasoning and flexible thinking. Our provision seeks to create students that are successful, aspirational, show integrity and are literate, to be able to achieve in a cross-curricular subject needed in other areas.

Year 7	Year 8	KS4 Foundation	KS4 Higher	Year 12 & 13
Through Years 7&8 at LNS we largely follow the White Rose Maths curriculum which has been designed with Teaching for Mastery in mind. Each half term is split into smaller blocks that ensure students spend enough time getting a deep understanding of the work. has been designed with interleaving as a key element, so topics previously taught are revisited within new contexts. For example, year 7 starts with algebraic thinking and further development of algebraic skills is then woven throughout the year so that students reinforce and extend their knowledge and understanding. We have a focus on reasoning and problem solving. The units are around 6 weeks long each so roughly follow a half term each.		At LNS, we begin the GCSE Scheme of work at the start of year 9, largely following the Pearson curriculum, which is the exam board we use for GCSE. Students are expected to put into practice and develop the skills and knowledge they learned through years 7 and 8. Students are expected to be able to discuss, interpret, describe and solve problems. They continue to look at the key topic areas of Number, Algebra, Ratio 7 Proportion, Geometry, Probability and Statistics. The aim is for students to meet the rigours of the maths specification, as well as succeed in using maths within other subjects, at home, and later in their further academics or careers. Students work on a split higher and foundation level through the GCSE course, dependent on their attainment through years 7&8. There is opportunity to change tiers depending on the current attainment of students.		At LNS, we follow the Pearson Curriculum for A Level mathematics, which is the exam board we use. In year 12 students learn all of the year 1 content which is assessed on the AS Level examination. The A level course in mathematics introduces advanced techniques for students including the use of calculus, coordinate geometry, trigonometric and exponential functions, sequences and series. Students also undertake units in statistics and mechanics which encourage critical thinking and enable students to tackle a wide range of practical problems.
Unit 1: Algebraic Thinking This unit is designed to start to increase the algebraic fluency of our year 7 students. They will look	**Unit 1: Proportional Reasoning** Year 8 starts with ratio & scale, followed by multiplicative change, then multiplying and dividing	Year 9 **Unit 1: Number** This number goes over the building blocks of the GCSE course, with	Year 9 **Unit 1: Number** This unit builds on the KS3 knowledge building blocks of	Year 12 (AS level) **Pure Mathematics** Ch. 1: Algebraic Expressions Ch. 2: Quadratics

at the small steps of exploring sequences, understanding & using algebraic notation and equality & equivalence.

Unit 2: Place Value and Proportion
Unit 2 is based on number skills, with half of the unir focusing on place value and ordering numbers, the second small step is on fractions, decimals and percentages.

Unit 3: Application of Number
Unit 3 is based on calculations with numbers and how they can be applied. The first small step is based on addition and subtraction, followed by multiplication and division, and finally fractions and percentages of amounts.

Unit 4: Directed Number and Fractional Thinking
This unit has two small steps, firstly directed numbers followed by adding and subtracting fractions.

Unit 5: Lines and Angles
The first small step in unit 5 is constructions and measures. Secondly we will be learning geometric reasoning.

Unit 6: Reasoning with Number

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fractions.

Unit 2: Representations
The representations unit consists of working in the cartesian plane, representing data and probability

Unit 3: Algebraic Techniques
The largest proponent of unit 3 is brackets, equations and inequalities, as well as small steps on sequences and indices.

Unit 4: Developing Number
Unit 4 has focus on fractions, percentages, including the use of multipliers, standard index form and number sense, including estimation.

Unit 5: Developing Geometry
Developing Geometry begins with angles in parallel lines and polygons, then area of trapezia and circles followed by line symmetry and reflection.

Unit 6: Reasoning with Data
The final unit of our KS3 curriculum consists of the data handling cycle and measures of location and dispersion.

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focus on calculations, rounding, factors, multiples and primes.

Unit 2: Algebra
This unit checks the algebraic fluency needed for the rest of the GCSE course. Simplification, brackets and substitution.

Unit 3: Graphs, tables & charts
This unit has a focus on student's understanding of different data representations including pie charts and scatter graphs

Unit 4: Fractions, Decimals & Percentages
A focus on the equivalence of different forms and how to convert between them. Different operations with fractions and percentage of amounts.

Unit 5: Equations, Inequalities & Sequences
The key area of unit 5 is solving equations, with a look at inequalities and sequences as well as rearranging formulae.

Unit 6: Angles
Students learn the properties of shapes and angle facts, including polygons and parallel lines.

Unit 7: Averages and Range
Students will learn to find and use different averages and the range, as well as looking at how to plan a statistical investigation and sampling.

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number, and stretches students with fractional indices and surds.

Unit 2: Algebra
Unit 2 develops algebraic fluency, going over algebraic manipulations, setting up and solving equations, rearranging formulae and sequences including quadratic.

Unit 3: Interpreting and Representing Data
Unit 3 looks at averages, the range, and some of the more basic data representations on the higher GCSE course including scatter graphs.

Unit 4: Fractions, ratio and percentages
Equivalence of fractions, decimals and percentages as well as calculations and operations with these. Students look at ratio and proportion with a focus on problem solving.

Unit 5: Angles and Trigonometry
Students start the unit looking at angles in polygons and parallel lines before moving onto right angles triangles, applying Pythagoras' Theorem and trigonometry.

Unit 6: Graphs
This unit mainly looks at linear graphs within the cartesian plane, as well as real life graphs and quadratic graphs.

Unit 7: Area and Volume

Ch. 3: Equations and Inequalities
Ch. 4: Graphs and Transformations
Ch. 5: Straight Line Graphs
Ch. 6: Circles
Ch. 7: Algebraic Methods
Ch. 8: The Binomial Expansion
Ch. 9: Trigonometric Ratios
Ch. 10: Trigonometric Identities and Equations
Ch. 11: Vectors
Ch. 12: Differentiation
Ch. 13: Integration
Ch. 14: Exponentials and Logarithms
Statistics
Ch. 1: Data Collection
Ch. 2: Measures of Location and Spread
Ch. 3: Representations of Data
Ch. 4: Correlation
Ch. 5: Probability
Ch. 6: Statistical Distributions
Ch. 7: Hypothesis Testing
Mechanics
Ch. 8: Modelling in Mechanics
Ch. 9: Constant Acceleration
Ch. 10: Forces and Motion
Ch. 11: Forces and Motion

Year 2 Content:
Pure Mathematics
Ch. 1: Algebraic Methods
Ch. 2: Functions and Graphs

The final unit of year 7 consists of three small steps. Developing number sense, probability and set notation and finally prime numbers and proof.		**Year 10** **Unit 8: Perimeter, Area & Volume** Starting with checking the KS3 knowledge of area and perimeter before developing into 3D shapes and volume. **Unit 9: Graphs** This unit focuses on linear graphs in the cartesian plane as well as real life graphs. **Unit 10: Transformations** Students will be able to carry out and describe translations, rotations, reflections, enlargements and combinations of the four transformations. **Unit 11: Ratio & Proportion** A focus on solving problems involving ratio and proportion, including sharing with ratio, and inverse proportion. **Unit 12: Right-angles Triangles** Students will learn how to use and apply both Pythagoras' Theorem and trigonometry for right angled triangles. **Unit 13: Probability** Students will look at independent events, mutually exclusive events as well as different representations including tree and venn diagrams. **Year 11** **Unit 14: Multiplicative Reasoning**	This unit looks at area and volume of various shapes, including composite 3D shapes. This unit also covers accuracy and bounds. **Year 10** **Unit 8: Transformations & Constructions** Students will be able to carry out and describe translations, rotations, reflections, enlargements and combinations of the four transformations. Students learn to construct bisectors and loci, as well as looking at scale drawings and bearings. **Unit 9: Equations and Inequalities** Students increase their algebraic fluency with a focus on quadratics, solving by factorising, completing the square and using the formula. Students also study simultaneous equations and inequalities. **Unit 10: Probability** Students will look at independent events, mutually exclusive events and conditional probability. Students will learn different representations including tree and venn diagrams. **Unit 11: Multiplicative Reasoning** This unit looks at compound measures (speed, density and pressure), percentage change and repeated percentage change. It	Ch. 3: Sequences and Series Ch. 4: Binomial Expansion Ch. 5: Radians Ch. 6: Trigonometric Functions Ch. 7: Trigonometry and Modelling Ch. 8: Parametric Equations Ch. 9: Differentiation Ch. 10: Numerical Methods Ch. 11: Integration Ch. 12: Vectors **Statistics** Ch. 1: Regression, Correlation and Hypothesis Testing Ch. 2: Conditional Probability Ch. 3: The Normal Distribution **Mechanics** Ch. 4: Moments Ch. 5: Forces and Friction Ch. 6: Projectiles Ch. 7: Applications of Forces Ch. 8: Further Kinematics

This unit looks at compound measures (speed, density and pressure), percentage change and repeated percentage change.

Unit 15: Constructions, Loci & bearings
Students learn to construct triangles, bisectors and loci, as well as looking at scale drawings and bearings.

Unit 16: Quadratic equations & graphs
Students will develop their algebraic thinking with expanding and factoring quadratic expressions and solving equations. They will also look at quadratic graphs.

Unit 17: Perimeter, area & volume 2
The more advanced unit on perimeter, area and volume looks at circles as well as complex 3D shapes such as pyramids, cones and cylinders.

Unit 18: Indices and standard form
Unit 18 looks at reciprocals, indices and converting numbers into standard form as well as calculating.

Unit 19: congruence, similarity and vectors
This unit looks at geometric reasoning with similarity and congruence, as well as an introduction to vectors.

also looks into direct and inverse proportion

Unit 12: Similarity and Congruence
This unit looks at geometric proof with congruence as well as similarity in 2D and 3D shapes.

Unit 13: Advanced Trigonometry
Students will be able to apply the sine and cosine rule as well as graphs of trigonometric functions.

Unit 14: Further Statistics
Unit 14 consists of more complex data representations including box plots, histograms and cumulative frequency curves.

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Unit 15: Equations and Graphs
This unit is designed to improve students' understanding of algebra and how it links to graphs. Students solve simultaneous equations graphically and look at inequality regions.

Unit 16: Circle Theorems
Students learn the different circle theorems and how to apply them. This unit also covers how to prove circle geometry.

Unit 17: More Algebra
Unit 17 is aimed at the top GCSE level and closing the gap to A Level. The unit focuses on algebraic fractions, manipulating algebra, function notation and algebraic

| | | **Unit 20: Further algebra**
The final unit for the foundation scheme of work looks at advanced algebra topics including simultaneous equations, cubic and reciprocal graphs. | proof.
Unit 18: Vectors and Geometric Proof
This unit starts with introducing vectors, and looks at parallel vectors as well as geometric proof.
Unit 19: Proportion and Graphs
The final unit for higher looks at transformations of functions, reciprocal functions, as well as the gradient and area under graphs including velocity time graphs. | |

| **Literacy**:

We look at key vocabulary for each lesson, and encourage students to use mathematical language and high levels of oracy within maths lessons. Students need to be able to write clear answers for reasoning questions. | **Extra Curricular Opportunities:**

We run the UMKT Maths challenges for students in years 8 and 10, and students in years 7 and 9 are encouraged to have a go at these as well. We encourage KS3 students to come to maths club.

We have links with King's Maths School for high attainers which includes GCSE+ enrichment sessions for years 9-11, revision sessions prior to exams for year 11s and Maths circles for high attaining key stage 3 students.

We have trips including Bletchley Park and run an interwatch countdown competition. |