



‘The building blocks of the world, a set of methods, a thing of beauty’

“The only way to learn Mathematics is to do Mathematics” – Paul Halmos

In Mathematics at Little Heath School, we aim to develop independent learners who are fully prepared for Mathematics outside of the school environment. Our overall aim is for students to enjoy Mathematics whatever their ability and be able to be numerate enough to be able to solve Mathematical problems in real life situations. Our desire is that some students would continue to celebrate Mathematical success into the future above and beyond their natural ceiling.

Through a study of Mathematics, we aim to develop students as follows:

The aim is for students to enjoy learning within Mathematics for its usefulness and for its own merit regardless of ability. Maths develops rational and logical thinking which are required for many aspects of everyday life and are attractive to future employment.

Students will be encouraged to develop effective strategies for revision within lessons to revisit their learning using both Active Recall and Spaced Repetition.

The Mathematics Department will work with other subjects, particularly the STEM subjects to build cross curricular links. They will design innovative and engaging lessons that are engaging and fun to help develop student’s problem solving skills as well as independent learning and team work. The new curriculum involves a lot of problem solving and the department would like to incorporate applying Maths in the real world into the students learning as much as problem.

Mathematics is a Universal Language. It is fun and an incredibly exciting subject. We have a desire for students to be able to contribute to the school and the local community and to provide students with more opportunities to attend inspirational lectures and visits wherever possible. Students already help others within the department and we want to continue this as well as providing other opportunities for students to extend and grow.



KS3 Mathematics Curriculum Overview (*Year 7 and 8*)

At Little Heath School we have created a KS3 Scheme of Work with two central aims. Our first aim is to provide students arriving with different experiences of KS2 Maths with a solid grounding in the core skills needed to access the KS4 curriculum; ready to begin the Maths GCSE in year 9. We aim to build resilient and confident learners, with an armoury of tools to build upon at GCSE level. Regardless of their prior attainment level, we want all students to consolidate their learning, ready to achieve their potential at KS4.

Secondly, we want to develop independent learners with inquisitive and enquiring minds, ready to solve problems and appreciate strategy and the beauty of mathematics in the real world. We want our students to see the doors that numeracy and logical skills can open for them in their own futures, and how their mathematical skills will help them to succeed whatever path they choose. We like to see students' curiosity stimulated by challenge and to see them working both collaboratively and independently towards a shared goal of improvement.

At Little Heath, we have adapted our Scheme of Work to become more flexible to support the teaching of the key skills students will need for their GCSE exams and throughout the KS4 curriculum, while trying to introduce more problem solving and real life elements, alongside trying to reduce ability barriers. Although still differentiated into three strands, this is simply to be used as a guide for teachers, who can easily view the intended learning objectives of other classes and can choose to stretch and challenge their classes where appropriate. Enriching and problem solving activities are shared for easy access and to provide ideas to KS3 teachers.

However, the KS3 maths Scheme of Work is very much a 'working document' where teachers are encouraged to add any resources they have found to have a positive impact on the learning of our students. Due to the current National Curriculum and guidelines for assessing maths at GCSE level, we formally assess students 3 times throughout the year to give them experience of exam conditions, preparation and techniques. We use these assessments to track progress and give students both verbal and written feedback.



YEAR 7

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|--|--|---|---|--|---|
| TOPIC | Number 1 and Statistics 1 | Algebra 1, Shape 1 | Number 2, Algebra 2 | Statistics 2, Shape 2, Number 3 | Number 3, Algebra 3, Revision | Shape 3, Statistics 3 |
| KEY CONCEPTS | Calculations, Rounding and Properties of Number, Collecting and representing data | Introduction to algebra, Expressions and Equations, 2D and 3D shapes | Fractions, Decimals and Percentages, Expressions, Equations and Sequences | Averages and Range, Angles Ratio and Proportion | Ratio and proportion, Straight line graphs, Revision | Scale, Measure and Constructions, Introduction to Probability |
| ASSESSMENT | Baseline Assessment Assessment 1- Non Calculator 40 minute in class paper. Revision packs and lists provided on SMHW 2 weeks prior to assessment | | Assessment 2- Calculator 40 minute in class paper. Revision packs and lists provided on SMHW 2 weeks prior to assessment | | Assessment 3 (End of Year) - 2 x 40 minute in class papers. 1 x non-calculator, 1 x Calculator. Revision packs and lists provided on SMHW 2 weeks prior to assessment | |

YEAR 8

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|---|--|---|--|--|--|
| TOPIC | Number 4, Algebra 4 | Statistics 4, Shape 4 | Number 5, Revision, Statistics 5 | Statistics 5, Algebra 5, Number 6 | Number 6, Revision, Shape 5 | Shape 5, Algebra 6, Shape 6 |
| KEY CONCEPTS | Calculations, Estimation and Properties of number, Equations, Formulae and Inequalities | Collecting and representing data, Area, Perimeter and Volume | Fractions, decimals and percentages, Revision, Averages, range and probability | Averages, range and probability, Equations, Formulae and sequences, Ratio and Proportion | Ratio and Proportion, Revision, Angles | Angles, Graphs and Inequalities, Transformations |
| ASSESSMENT | Assessment 4- Non Calculator 40 minute in class paper. Revision packs and lists provided on SMHW 2 weeks prior to assessment | | Assessment 5- Calculator 40 minute in class paper. Revision packs and lists provided on SMHW 2 weeks prior to assessment | | Assessment 6 (End of Year) - 2 x 40 minute in class papers. 1 x non-calculator, 1 x Calculator. Revision packs and lists provided on SMHW 2 weeks prior to assessment | |



KS4 Mathematics Curriculum Overview (Year 9, 10 and 11)

The aim of our KS4 maths curriculum is a very important one. We will be working with our students to help prepare them with the skills and tools to become active members of society. Students will be starting to develop the skills that they will need for when they need work.

Our students will need Maths for jobs such as checking correct change, using spreadsheets and understanding data. They will need to be able to read timetables and to be able to cook and therefore read recipes and adapt them for the number of guests that they are going to have.

When students move house or perhaps they go to university they will need to start budgeting. They will need to know all the financial implications of borrowing money and how to check that they are getting good deals on the offers they are being given. Have they received the correct change for the item they just bought? Is the medicine they are administering the correct dose? Can they do everyday tasks such as tell the time and arrive to appointments when they are supposed to?

As well as preparing our students for their GCSE examinations which is obviously incredibly important, we also look to prepare our KS4 students for their next steps in life. That may in fact be A levels and KS5, but for some students it may be moving into a job and/or an apprenticeship.

Similarly, to KS3, at KS4 we have adapted our Scheme of Work into three strands. These strands are Foundation, Higher and Extension. We start the GCSE Specification in Year 9 and teach the GCSE course through until Year 11. Students either follow the Foundation or the Higher Scheme of Work, with those students taking the Further Maths GCSE as well following the Extension Scheme of Work.

Students are formally assessed three times throughout years 9 and 10 and then are assessed in line with the main school assessment windows in Year 11 as outlined in the details below. Assessments are used to track progress and ascertain areas to improve. After each assessment students are given both verbal and written feedback and time to upgrade their assessments.

Towards the end of year 11, a tailored revision programme is put together for each class once the course has been completed, to start revising previous topics from the entire specification. This is done based on assessment of the class strengths and weaknesses, based on formal and informal assessment. Weaker topics are revisited to improve individual topic understanding and hence overall understanding of the course.



YEAR 9: FOUNDATION

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|---|--|--|--|---|--|
| TOPIC | Unit 1 – Number, Revision | Unit 2 – Algebra, Unit 3 – Graphs, tables and charts, Upgrading | Unit 4 – Fractions and percentages, Unit 5 – Equations, inequalities and sequences, Revision | Unit 5 continued – Equations, inequalities and sequences, Unit 6 - Angles, Revision, Upgrading | Unit 6 continued – Angles, Unit 7 – Averages and range, Revision | Unit 7 continued – Averages and range, Revision, Unit 8 – Perimeter, Area and Volume, Upgrading |
| KEY CONCEPTS | 1) Calculations, decimal numbers, place value, factors and multiples, squares cubes and roots, index notation and prime factors Revision | Upgrading 2) Algebraic expressions, simplifying expressions, substitution, formulae, expanding brackets, factorising, using expressions and formulae 3) Frequency tables, two way tables, representing data, time series, stem and leaf diagrams, pie charts, scatter graphs, line of best fit | 4) Fractions (add, subtract, fraction of amount, multiply, divide). Convert fractions to decimals, fractions and percentages 5) Solving simple linear equations, two step equations, equations with brackets and unknowns on both sides, inequalities, formulae, generating sequences, using the nth term of a sequence | 5) Unit 5 continued see term 3 Revision upgrading 6) Properties of shapes, angles in parallel lines, angles in triangles, exterior and interior angles, geometric problems | 6) Unit 6 continued see term 4 7) Mean, range, mode, median, modal class, mean from frequency table estimate range from grouped data, median from frequency table, mean from frequency table Revision | Upgrading 7) Unit 7 continued see term 5 Unit 8 – Perimeter, Area and Volume 8) Area of basic shapes, Area of compound shapes, surface area of 3D solids, Volume of prisms |
| ASSESSMENT | Learning Review 1: Paper 1: 40 mins non-calculator Paper 2: 40 mins calculator | | | Learning Review 2: Paper 1: 45 mins non-calculator Paper 2: 45 mins calculator | | Learning Review 3 - End of year assessment Paper 1: 45 mins non-calculator Paper 2: 45 mins calculator |



YEAR 9: HIGHER

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|---|---|--|---|--|--|
| TOPIC | Unit 1 – Number, Revision | Upgrading Unit 2 – Algebra, Unit 3 – Interpreting and representing data | Unit 4 – Fractions, ratio and proportion, Unit 5 – Angles and trigonometry, Revision | Unit 5 continued – Angles and trigonometry, Unit 6 - Graphs, Revision Learning Review 2 Upgrading | Unit 6 continued – Graphs, Unit 7 – Area and volume | Unit 7 continued – Area and volume Unit 8 – Transformation and Coordinates |
| KEY CONCEPTS | Upgrading 1) Number properties and reasoning, Place value and estimating, HCF and LCM, indices, standard form, surds | 2) Algebraic indices, Expanding and factorising, equations, formulae, linear and non-linear sequences, expanding two brackets, difference of two squares, factorising quadratics 3) Statistical diagrams, time series, scatter graphs and line of best fit, averages and range | 4) Fractions, ratios, proportion, percentages, decimals 5) Angle properties of triangles and quadrilaterals, interior and exterior angles of a polygon, Pythagoras' theorem, trigonometry | 5) Unit 5 continued – see term 4 Revision Upgrading 6) Linear graphs, graphing rates of change, real life graphs, line segments, quadratic graphs, cubic and reciprocal graphs | 6) Unit 6 continued – see term 4 Revision | 7) Perimeter and area, units and accuracy, prisms, circles, sectors of circles, cylinders and spheres, pyramids and cones 8) Reflection, Rotation, Translation, Enlargement, Combinations of transformations, Bearings and scale drawings, Constructions and Loci |
| ASSESSMENT | Learning Review 1: Paper 1: 40 mins non calculator Paper 2: 40 mins calculator | | | Learning Review 2: Paper 1: 45 mins non calculator Paper 2: 45 mins calculator | | Learning Review 3 - End of year assessment Paper 1: 1 hr non calculator Paper 2: 1 hr calculator |



YEAR 9: EXTENSION

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|--|--|---|--|---|---|
| TOPIC | Unit 1 – Number, Revision | Upgrading Unit 2 – Algebra, Unit 3 – Interpreting and representing data | Unit 4 – Fractions, ratio and proportion, Unit 5 – Angles and trigonometry, Revision | Upgrading, Unit 5 continued – Angles and trigonometry , Unit 6 - Graphs | Unit 7 – Area and volume, Revision | Upgrading Unit 7 continued – Area and volume Unit 8 – Trans-formations and coordinates Unit 9 – Equations and Inequalities |
| KEY CONCEPTS | 1) Number properties and reasoning, Place value and estimating, HCF and LCM, indices, standard form, surds | 2) Algebraic indices, expanding and factorising, equations, formulae, linear and non- linear sequences, expanding two brackets, difference of two squares, factorising quadratics 3) Statistical diagrams, time series, scatter graphs and line of best fit, averages and range | 4) Fractions, ratios, proportion, percentages, decimals 5) Angle properties of triangles and quadrilaterals , interior and exterior angles of a polygon, Pythagoras’ theorem, trigonometry 6) Linear graphs, graphing rates of change, real life graphs, line segments, quadratic graphs, cubic and reciprocal graphs | 6) Unit 6 continued – see term 3 Revision Upgrading | 7) Perimeter and area, units and accuracy, prisms, circles, sectors of circles, cylinders and spheres, pyramids and cones Revision | Upgrading 7) Unit 7 continued – see term 5 8) 3D Solids, Reflection and rotation, Enlargement, Translations and combinations of trans-formations, bearings and scale drawings, constructions, loci 9) Solving quadratic equations, Completing the square, Simultaneous linear equations in two variables, Linear and quadratic simultaneous equations, Linear inequalities |
| ASSESSMENT | Learning Review 1: Paper 1: 40 mins non calculator Paper 2: 40 mins calculator | | | Learning Review 2: Paper 1: 45 mins non calculator Paper 2: 45 mins calculator | | Learning Review 3 - End of year assessment Paper 1: 1 hr non calculator Paper 2: 1 hr calculator |



YEAR 10: FOUNDATION

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|---|--|--|--|---|---|
| TOPIC | Unit 8 – Perimeter, Area and Volume Revision Upgrading Unit 9 – Graphs | Unit 9 – Graphs continued - see term 1 Unit 10 – Transformations Unit 11 – Ratio and Proportion | Revision Upgrading Unit 11 – Ratio and Proportion continued Unit 12 – Right Angled Triangles, | Unit 11 – Ratio and Proportion continued Unit 12 – Right Angled Triangles, Unit 13 – Probability | Unit 13 – Probability continued Unit 14 - Multiplicative Reasoning Revision | Unit 15 – Construction, Loci and Bearings Upgrading Unit 16 – Quadratic Equations and Graphs |
| KEY CONCEPTS | 8) Area of basic shapes, Area of compound shapes, surface area of 3D solids, Volume of prisms. Revision Upgrading 9) Coordinates, Linear Graphs, Gradient, $y = mx + c$, Real life graphs, Distance Time Graphs Real-life graphs Problem solving | 9) Unit 9 continued 10) Translation, Reflection, Rotation, Enlargement, Describing Enlargements, Combining Transformations Revision, Upgrading, 11) Writing ratios, Ratios and measures, Comparing ratios, Using proportion | Revision Upgrading 11) Ratio and Proportion continued – see term 2 12) Pythagoras' Theorem, Trigonometry (The Sine ratio, The Cosine ratio, The Tangent ratio) | 11) Ratio and Proportion continued – see term 2 12) Unit 12 continued see term 3 13) Calculating Probability, Two events, Experimental Probability, Venn Diagrams, Tree Diagrams | 13) Unit 13 – Probability continued 14) Compound Measures, Distance, Speed and Time, Direct and Inverse Proportion Percentages, Growth and Decay, Revision | 15) 3D Solids, Plans and Elevations, Accurate Drawings, Scale Drawings and Maps, Constructions, Loci and Regions, Bearings, Upgrading 16) Expanding Double Brackets, Plotting Quadratic Graphs, Using Quadratic Graphs, Factorising Quadratic Expressions, Solving Quadratic equations algebraically |
| ASSESSMENT | Learning Review 4: Paper 1: 40 mins non-calculator Paper 2: 40 mins calculator | | Learning Review 5 (Year 10 PPE's) Paper 1: 40 mins non-calculator Paper 2: 40 mins calculator | | Learning Review 6: Paper 1: 45 mins non-calculator Paper 2: 45 mins calculator | |



YEAR 10: HIGHER

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|---|--|--|--|--|--|
| TOPIC | Unit 8 – Transformations and Coordinates Revision, Upgrading, Unit 9 – Equations and Inequalities | Unit 9 continued Unit 10 – Probability Unit 11 – Multiplicative Reasoning | Revision Upgrading Unit 11 continued – Multiplicative Reasoning, Unit 12 – Similarity and Congruence | Unit 12 continued – Similarity and congruence, Unit 13 – More Trigonometry | Unit 14 – Further Statistics, Unit 15 – Equations and Graphs, Revision | Unit 15 continued – Equations and graphs Upgrading Unit 16 – Circle Theorems |
| KEY CONCEPTS | 8) 3D Solids, Reflection and rotation, Enlargement, Translations and combinations of transformations, bearings and scale drawings, constructions, loci Revision Upgrading 9) Quadratic Equations, Completing the square, Simple simultaneous equations, Linear and quadratic simultaneous equations, linear inequalities | 9) Unit 9 continued – Equations and Inequalities 10) Combined Events, Mutually exclusive events, experimental probability, independent events and tree diagrams, conditional probability, Venn diagrams and set notation 11) Growth and decay, Compound measures, Ratio and Proportion | Revision Upgrading 11) Unit 11 continued see term 2 12) Congruence Geometric Proof, Similarity, Similarity in 3D Solids | 12) Unit 12 continued see term 3 13) Graph of the sine function, Graph of the Cosine Function, The Tangent Function, Calculating Areas and the Sine Rule, The Cosine Rule and 2D Trigonometric Problems, Solving Problems in 3D, Transforming Trigonometric Graphs 1 and 2, Exact Trig Ratios | 14) Sampling, Cumulative Frequency, Box Plots, Drawing Histograms, Interpreting Histograms, Comparing and Describing Populations 15) Solving Simultaneous equations graphically, Representing Inequalities Graphically, Graphs of Quadratic Functions, Solving Quadratic Equations Graphically, Graphs of Cubic Functions, Revision | 15) Unit 15 continued – see term 5 Upgrading 16) Radii and Chords, Tangents, Angles in Circles, Applying Circle Theorems |
| ASSESSMENT | Learning Review 4: Paper 1: 45 mins non-calculator Paper 2: 45 mins calculator | | Learning Review 5 (Year 10 PPE's) Paper 1: 40 mins non-calculator Paper 2: 40 mins calculator | | Learning Review 6: Paper 1: 45 mins non-calculator Paper 2: 45 mins calculator | |



YEAR 10: EXTENSION

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|--|---|---|---|---|--|
| TOPIC | <p>Unit 10 – Probability</p> <p>Revision Upgrading</p> | <p>Unit 11 – Multiplicative reasoning</p> <p>Unit 12 – Similarity and Congruence,</p> <p>Unit 13 – More Trigonometry</p> | <p>Revision Upgrading</p> <p>Unit 14 – Further Statistics</p> | <p>Unit 15 – Equations and Graphs</p> <p>Further Maths – Equation of a Circle</p> <p>Further Maths Additional 1 - Inequalities</p> | <p>Further Maths Additional 1 Inequalities Continued,</p> <p>Unit 16 – Circle Theorems,</p> <p>Unit 17 – More Algebra Revision</p> | <p>Unit 17 continued – More Algebra Upgrading</p> <p>Further Maths Additional 2 – Factor Theorem,</p> <p>Unit 18 - Vectors and Geometric Proof</p> |
| KEY CONCEPTS | <p>10) combined events, mutually exclusive events, experimental probability, independent events and tree diagrams, conditional probability, Venn diagrams and set notation</p> <p>Revision Upgrading</p> | <p>11) Growth and decay, Compound measures, Ratio and Proportion</p> <p>12) Congruence Geometric Proof, Similarity, Similarity in 3D Solids</p> <p>13) Graph of the sine function, Graph of the Cosine Function, The Tangent Function, Calculating Areas and the Sine Rule, The Cosine Rule and 2D Trigonometric Problems, Solving Problems in 3D, Transforming Trigonometric Graphs 1and2, Exact Trig Ratios</p> | <p>Revision Upgrading</p> <p>14) Sampling, Cumulative Frequency, Box Plots, Drawing Histograms, Interpreting Histograms, Comparing and Describing Populations</p> | <p>15) Solving Simultaneous equations graphically, Representing Inequalities Graphically, Graphs of Quadratic Functions, Solving Quadratic Equations Graphically, Graphs of Cubic Functions</p> <p>Further Maths equations of a circle – Centred on the origin, centred on a point, equation of a tangent at a point on a circle</p> <p>Further Maths Additional 1 – Inequalities - Linear inequalities, Quadratic Inequalities, Graphical inequalities</p> | <p>Further Maths Additional 1 continued see term 4</p> <p>16) Radii and Chords, Tangents, Angles in Circles, Applying Circle Theorems</p> <p>17) Unit 17 - Rearranging Formulae, Algebraic Fractions, Surds, Solving Algebraic Fractions Equations, Functions, Proof Revision</p> | <p>17) Unit 17 continued Further Maths Additional 2 – Factor Theorem – Manipulation of rational expressions, Use and manipulation of formulae and expressions, Factor theorem</p> <p>18) Vectors and Vector notation, Vector Arithmetic, Parallel Vectors and Collinear Points, Solving Geometric Problems</p> |
| ASSESSMENT | <p>Learning Review 4: Paper 1: 45 mins non-calculator</p> <p>Paper 2: 45 mins calculator</p> | | <p>Learning Review 5 (Year 10 PPE's)</p> <p>Paper 1: 40 mins non-calculator</p> <p>Paper 2: 40 mins calculator</p> | | <p>Learning Review 6: Paper 1: 45 mins non-calculator</p> <p>Paper 2: 45 mins calculator</p> | |



YEAR 11: FOUNDATION

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|---|--|---|--|--|------------------------------------|
| TOPIC | <p>Unit 17 – Perimeter, Area and Volume 2</p> <p>Unit 18 – Fractions, Indices and Standard Form Revision of Algebra</p> | <p>Unit 18 – Fractions, Indices and Standard Form Revision of Algebra</p> <p>Unit 19 – Congruence, Similarity and Vectors</p> | <p>Unit 20 – More Algebra</p> <p>Year 11 PPEs Revision of Previous Topics</p> | <p>Year 11 PPEs, Tailored Revision Programme</p> | <p>Tailored Revision Programme, WTM Window</p> | <p>Tailored Revision Programme</p> |
| KEY CONCEPTS | <p>17) Perimeter, Area and Volume 2 – Circumference of a Circle, Area of a Circle, Semicircles and Sectors, Composite 2D Shapes, Pyramids, Cones and Spheres</p> <p>18) Multiplying and Dividing Fractions, The Laws of Indices, Writing Large Numbers in Standard Form, Writing Small Numbers in Standard Form, Calculating in Standard Form, Revision</p> | <p>18) Multiplying and Dividing Fractions, The Laws of Indices, Writing Large Numbers in Standard Form, Calculating in Standard Form, Revision</p> <p>19) Similarity and congruence including congruent triangles, Angles facts including parallel lines, vectors</p> <p>Upgrading</p> | <p>20) Graphs of Cubic and Reciprocal Functions, Non-Linear Graphs, Solving Simultaneous Equations Graphically, Solving Simultaneous Equations Algebraically, Rearranging Formulae, Proof</p> <p>Start revision of previous units (tailored revision programme)</p> | <p>A tailored revision programme based on the topics that are identified as topics that the class does not understand from lessons, assessments and teacher judgment will be created to help students prepare for the final exam. Students will revisit topics from years 9 – 11 to improve their weaker areas and improve their skills in preparation for the examinations.</p> | | |
| ASSESSMENT | <p>Year 11 PPEs: Paper 1: 1.5hr Non Calculator Paper 2 and 3: 1.5hr Calculator (last wk trm1 1st term 2)</p> | <p>Year 11 PPEs: Paper 1: 1.5hr Non Calculator Paper 2 and 3: 1.5hr Calculator (last wk trm1 1st term 2)</p> | | <p>Year 11 PPEs: Paper 1: 1.5hr Non Calculator Paper 2 and 3: 1.5hr Calculator</p> | | |



YEAR 11: HIGHER

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|---|--|---|--|---|-----------------------------|
| TOPIC | Unit 17 – More Algebra, Revision | Upgrading Unit 19 – Proportion and Graphs Unit 18 – Vectors and Geometric Proof | Problem Solving, Revision, Year 11 PPEs | Year 11 PPEs, Tailored Revision Programme | Tailored Revision Programme, WTM Window | Tailored Revision Programme |
| KEY CONCEPTS | 17) Rearranging Formulae, Algebraic Fractions, Simplifying Algebraic Fractions, More Algebraic Fractions, Surds, Solving Algebraic Fraction Equations, Functions, Proof Revision | 19) Direct Proportion, Inverse Proportion, Exponential Functions, Non-Linear Graphs, Translating Graphs of Functions, Reflecting and Stretching Graphs of Functions 18) Vectors and Vector notation, Vector Arithmetic, Parallel Vectors and Collinear Points, Solving Geometric Problems | Problem solving practice based on all of the previous topics from the last 3 years and general revision in preparation for the PPEs | A tailored revision programme based on the topics that are identified as topics that the class does not understand from lessons, assessments and teacher judgment will be created to help students prepare for the final exam. Students will revisit topics from years 9 – 11 to improve their weaker areas and improve their skills in preparation for the examinations | | |
| ASSESSMENT | Year 11 PPEs: Paper 1: 1.5hr Non Calculator Paper 2 and 3: 1.5hr Calculator (last wk trm1 1 st term 2) | Year 11 PPEs: Paper 1: 1.5hr Non Calculator Paper 2 and 3: 1.5hr Calculator (last wk trm1 1 st term 2) | | Year 11 PPEs: Paper 1: 1.5hr Non Calculator Paper 2 and 3: 1.5hr Calculator | | |



YEAR 11: EXTENSION

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|---|--|--|--|---|-----------------------------|
| TOPIC | Unit 19 – Proportion and Graphs, Revision | Upgrading, Further Maths Additional 3 – Functions, Revision Further Maths Additional 4 – Matrices | Further Maths Additional 5 – Calculus, Further Maths Additional 6 – Ratios of angles and their graphs, Year 11 PPEs | Year 11 PPEs, Tailored Revision Programme | Tailored Revision Programme, WTM Window | Tailored Revision Programme |
| KEY CONCEPTS | 19) Direct Proportion, Inverse Proportion, Exponential Functions, Non-Linear Graphs, Translating Graphs of Functions, Reflecting and Stretching Graphs of Functions Revision | Upgrading Further Maths Additional 3 – Functions – Function notation, Domain and range, Composite functions, Inverse functions, Sketching graphs of linear quadratic and exponential functions, The significant points of a quadratic graphs Further Maths Additional 4 – Matrices – Introduction to matrices, The zero matrix and the identity matrix, Transformations, Combinations of transformations | Further Maths Additional 5 – Calculus – The gradient of a curve, More complex curves, The second derivative, Stationary points and curve sketching, The equation of a tangent and normal at any point on a curve, Further Maths Additional 6 – Ratios of angles and their graphs – Trigonometric ratios of angles between 90 degrees and 360 degrees, The circular function graphs, Special right angled triangles, Trigonometrical expressions and equations | A tailored revision programme based on the topics that are identified as topics that the class does not understand from lessons, assessments and teacher judgment will be created to help students prepare for the final exam. Students will revisit topics from years 9 – 11 to improve their weaker areas and improve their skills in preparation for the examinations | | |
| ASSESSMENT | Year 11 PPEs: Paper 1: 1.5hr Non Calculator Paper 2 and 3: 1.5hr Calculator (last wk trm1 1 st term 2) | Year 11 PPEs: Paper 1: 1.5hr Non Calculator Paper 2 and 3: 1.5hr Calculator (last wk trm1 1 st term 2) | | Year 11 PPEs: Paper 1: 1.5hr Non Calculator Paper 2 and 3: 1.5hr Calculator | | |



KS5 Mathematics Curriculum Overview (Year 12 and 13)

Mathematics is essential for everyday life and understanding the world we live in. It is used in many different areas to enable the human race to achieve progression in modern day life. It is essential to science, technology and engineering, and the advances in these fields on which our economic future depends. Students who have chosen to study mathematics beyond GCSE have the opportunity to participate in these areas and so it is fundamentally important to ensure that they all have the best possible mathematics education in the sixth form. They need to understand the mathematics they learn so they can be creative in solving problems as well as being confident and fluent in developing and using mathematical skills so valued in the world of industry and higher education.

Our aim for sixth form mathematics students is;

- To engender a vision of humanity, equality, aspiration and respect
- To set challenging targets with high expectations for all students
- To offer a variety of approaches to teaching and learning to engage and motivate students and demand their active participation
- To smooth the transition for students between KS4 and KS5 and ensure progression in teaching and learning regardless of their ability
- To offer and explore enrichment opportunities beyond the curriculum to enhance the students' enjoyment of mathematics
- To prepare them for the further study of mathematics and subjects with a high mathematics content in higher education or enable them to gain employment in these areas
- To encourage a love of Mathematics in the real world

These aims will be achieved through a distinctive department ethos of support which can be summarised as together we will all succeed. We will continue to treat students as partners in learning and will work together to give students the best possible experience of mathematics at Little Heath School. In the sixth form, students will become better independent learners and will become reflective of their own needs by our rigorous testing and up-grading, and self-assessment. The quality of teaching and learning will continue to be improved by further developing individuals and acknowledging that we are all learners and should strive continuously to improve our own mathematical understanding as well as our teaching and learning skills.



YEAR 12

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|---|---|--|---|--|---|
| TOPIC | Algebraic Expressions and Quadratics Graphs and Transformations , Equations and Inequalities, Algebraic Methods | Binomial Expansion, Proof, Trigonometry, Coordinate Geometry, Vectors | Differentiation and Integration, Trigonometric functions, Exponentials and Logarithms | Statistics- Working with data, Measures of location and spread, Probability, Statistical Distributions, Modelling in mechanics, Motion with constant acceleration | Variable acceleration, Forces and motion, Hypothesis Testing, Representation of data, Correlation and Regression | Large Data set Up-grading work, Year 2: Algebraic Methods, Binomial Expansion |
| KEY CONCEPTS | Solving, graphs, modelling quadratics, functions. Simultaneous Equations and Inequalities Expanding and Factorising, laws of indices, surds, sketching and transforming graphs, Factor Theorem, Algebraic long division | Pascal's triangle, Binomial expansion, Approximations , Proof- deduction, exhaustion, counter-example, Cosine and sine rule, Area of a triangle, Sine, cosine and Tangent graphs, sin, cos and tan of any angle, Equations of lines and circles, Differentiation from first principles and polynomials, Vectors in 2D, magnitude and direction, | Trig identities, Solving Trig equations and inequalities, solving geometric problems, Graphs of exponentials and logarithms, linear relationships, mathematical modelling Gradient, increasing and decreasing functions, stationary points, Integrating polynomials | SI units, assumption, scalar and vector quantities, displacement/ time, velocity/ time graphs, constant acceleration formulae, Area under a curve, understand key terms , mean, median, mode, range, interquartile range, standard deviation. Calculate probability, mutually exclusive and independent events, Venn diagrams, Discrete uniform distribution, Binomial distribution | Resultant forces, Newton's Laws, Connected Particles, Displacement, velocity and acceleration as a function of time, Hypothesis testing, representation of data REVISION | Partial fraction, Binomial expansion with negative and fractional indices |
| ASSESSMENT | Baseline Assessment Learning Review 1a and 1b | | Learning Review 2a and 2b Learning Review 3a and 3b | | PPE Transition work Yr 12 to 13 | |



YEAR 13

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|--|---|---|--|----------|--------|
| TOPIC | Functions and Graphs, Parametric Equations, Trigonometry and Modelling, Sequences and Series | Differentiation, Proof, Numerical Methods, Vectors | Integration, Moments, Forces and friction | Regression, correlation, hypothesis testing, Conditional probability, Normal distribution, Projectiles, Applications of forces, Further Kinematics | Revision | |
| KEY CONCEPTS | Modulus function, Mappings, Inverse and composite functions, Parametric equations and modelling, Radians, Sectors, sec, cosec, cot, trig formulae and identities, Arithmetic and Geometric Series, Sum to infinity | Chain, product quotient rule, parametric and implicit differentiation, rates of change, Proof by contradiction, Iteration, Newton Rhapsion, vectors in 3D, solving geometric problems | Integration of trig identities, by parts, by substitution, trapezium rule, Exponential models, measuring correlation, Resultant moments, equilibrium, centre of mass, friction on an inclined plane | Venn and tree diagrams, conditional probability, Standard normal distribution, approximation to the binomial distribution, Hypothesis testing, Horizontal and vertical components of projection, motion formulae, Friction on static particles, dynamic particles, connected particles | | |
| ASSESSMENT | Learning Review 3 Algebraic methods and Functions Learning review 4a Trig Learning review 4b Differentiation | | PPE Revision Weekend | | A2 Exams | |



YEAR 12: FURTHER MATHEMATICS

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|---|---|---|---|--|--|
| TOPIC | Complex Numbers, Series, Algorithms, Graphs and Networks, Algorithms on Graphs | Algebra and functions, Proof Discrete Random Variables, Starting Poisson | Critical path analysis, Vectors, Poisson and Binomial distributions (Including hypothesis testing), Chi Squared Tests | Calculus, Matrices and Linear Transformations, Linear programming Route Inspection Problem | Revision | Algorithms and Graphs, Route Inspection, Travelling Salesman Problem, Critical Path Analysis, Introduction to Hyperbolic Functions, Methods in calculus, Geometric distribution, Hypothesis testing |
| KEY CONCEPTS | Imaginary and complex numbers, roots of quadratics, Argand diagrams, Modulus – Argument, Sums of natural numbers, squares and cubes. Determinants, matrix inversion, solving equations, transformations. Bubble sort, quick sort, bin packing, Kruskal's, Prim's, Dijkstra's algorithms on graphs. Route inspection algorithm | Roots of polynomials, quadratic, cubic, quartic. Proof by induction, proof of divisibility, proof using matrices. Graphical methods to find the optimal point | Equation of a line and plane in 3D, angles between lines and planes, points of intersection, perpendiculars | Volumes of revolution about the x and y axis. Modelling a project, including dummy activities, calculating early and late times, floats, drawing Gantt charts | Use of past papers, Edexcel topic revision, Crash Maths, Textbook review exercises | Planarity and Floyd's Algorithm, Classical and practical TSP. Minimum spanning tree and Nearest neighbour algorithm, CPA- resource histograms and scheduling diagrams. Sinh, cosh and tanh, inverse and identities, differentiating and Integrating. Improper integrals, mean value of a function, Differentiating and integrating inverse trig functions, Improper integrals, Performing a significance test, critical values/regions, finding the significance of a test |



YEAR 12: FURTHER MATHEMATICS *Continued*

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|------------|---|--------|---|--------|--------|--|
| ASSESSMENT | Base line assessment Learning Review 1: Complex Numbers Learning Review 2: Series Learning Review 3: Algorithms and DRVs Learning Review 4: Proof by Induction Learning Review 5: Algebra and Functions Learning Review 6: Series | | Learning Review 7: Vectors Learning Review 8: Matrices Learning Review 9: Learning Review Learning Review 10: Volumes of Revolution Learning Review 11: DRVs Learning Review 12: Poisson and Binomial Learning Review 13: Goodness of Fit | | | AS Exam: Paper 1: Pure Paper 2: Stats Paper 3: Decision |



YEAR 13: FURTHER MATHEMATICS

| | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
|--------------|---|--|--|---|---|--------|
| TOPIC | The Simplex Algorithm, Complex Numbers, Negative Binomial Distribution, Goodness of Fit Test, Probability Generating Functions | Complex numbers, Series, Volume of Revolution, Quality of Tests, Revision of Decision | Revision and Past papers, Volume of Revolution, Hyperbolic Functions, Differentiation | Polar Coordinates, Methods and modelling in differential equations, Integration, Second Order Differential Equations | Revision | |
| KEY CONCEPTS | The simplex method to maximise or minimise a problem, the two-stage simplex method, the Big-M method, exponential form, De Moivre's theorem, Trig identities, sums of series, nth roots, Finding probabilities, performing a test, definition of PGF for standard distributions, mean, variance, sums of random variables | Geometric problems, Methods of differences, Maclaurin's series, Type 1 and 2 errors, application to the Normal distribution, finding the power and size of a test and the Power Function | Exam up-grading Volumes of revolution around the x-axis and y-axis, and parametrically defined curves, Modelling, Definition of Hyperbolic functions, solving domains, ranges, Knowledge of the graphs and inverse functions. Differentiation of inverse trig functions and hyperbolic functions | Sketching Polar Curves, Finding the area enclosed by a loop, tangents to curves, Standard Integrals, integration by substitution, hyperbolic functions, First Order Differential Equations solution by integrating factor and separating variables, Solving second order homogenous and non-homogenous equations using the complementary Function and Particular Integral, Simple Harmonic Motion, Solving Coupled First Order Differential Equations | Revision | |
| ASSESSMENT | Learning Review 1: Simplex Learning Review 2: Complex Numbers | | PPE + RAG + Upgrading Learning Review 3: Polar Coordinates | | Paper 1 Pure Paper 2 Pure Paper 3 Stats Paper 4 Decision | |



The Little Heath Mathematics Website

The Little Heath Mathematics Website has a vast expanse of information on it for all year groups. It has information such as details about the courses we run with links to resources such as videos, worksheets and worked solutions. It has links to other useful websites that are relevant to the courses, past papers and solutions and it also has fun activities to complete and videos to watch. This website is constantly being added to and updated and we strongly encourage students to monitor and use it on a regular basis. It is an excellent tool for revision and regular Mathematics Practice. A link to the website can be found below.

<https://sites.google.com/site/littleheathmaths/>

Enrichment Activities

Mathematics is a fun and exciting subject. Our aim is for all students to enjoy Mathematics and we like them to investigate the Mathematics around them wherever possible. There are plenty of opportunities for students to engage in Mathematics on a day to day basis and we encourage them to do so whenever we can.

Students are set homework using a variety of media including online homework platforms as well as investigative tasks and Project based work.

When certain aspects of Mathematics are linked to the outside or could be demonstrated in a larger space it is fun to take the students outside and topics such as Loci and Trigonometry lend themselves very well to fun and exciting lessons such as these.

Every year we enter students for the UKMT Mathematics challenge and regularly have students achieving Bronze, Silver and Gold certificates as well as students qualifying for the next round of the competition.

Students are invited to attend Maths Inspiration lectures at places such as Reading University and other Universities around the country.

Students attend Maths Conferences and Maths Activity Days throughout the year as well for various other reasons. These could be for reasons such as to help improve their grades, to teach them about Mathematical History and Coding, or to inspire them to study certain aspects of Mathematics in Further Education.

We have run an A Level Mathematics Revision weekend for Year 13 students for many years which is hugely successful and a lot of fun. It adds considerable value to final outcomes for those who attend. This weekend is designed to provide students with valuable revision materials for their A Level course and it helps them prepare for their forthcoming examination in a very clear and concise way.

In addition to A Level revision weekends we regularly encourage students to extend their knowledge of Mathematics after school. We run revision sessions after school for year 11 on previous topics from a pre-planned and published schedule, we encourage students to attend sessions to prepare for UKMT challenges, including team challenges, and every week we run FUNBUS. This is a highly attended A Level drop in club for students to come and seek help with their A Level studies. Students work with their peers and staff on homework and additional A level work to improve understanding.