Mathematics Knowledge Sequencing

Key Stage Three Mathematics Curriculum Intent:
- Knowledge to enhance independent learning
- Solve problems through resilience
- Higher level thinking
- Sense of enjoyment and curiosity

Prior Knowledge	KS3 offers the opportunity for pupils to consolidate and build upon the following prior learning: Solve number problems using appropriate written methods, applying an understanding of place value and the four basic operations to integers, fractions, decimals and percentages. Know and correctly apply symbols and/or letters to represent unknown values in problem-solving scenarios. Know key mensuration facts and use to solve problems. Determine whether solutions to numerical or mensuration problems are sensible by using estimation. Analyse and interpret statistical charts, averages and probability to solve problems.
Future Knowledge	The KS3 curriculum will ensure pupils are confidently able to clearly communicate their understanding of mathematical ideas and successfully apply these at GCSE.

	Term	Key Knowledge – model, practice, assess and retrieve	Assessment Focus
Year 7	1	Number skills-correctly apply written methods to the four basic operations for integers and decimals, including the use of directed number and application of BIDMAS. Learn how to use the full functionality of a scientific calculator. Know and use properties of polygons such as symmetry for correct identification. Solve basic area and perimeter problems, including composite shapes. Explore the history of coding and its impact on the world today.	Baseline assessment and Term 1 core knowledge and skills test
	2	Develop and use algebraic expressions in preparation for substitution, solving equations, quadratics, sequences and functions. Know and use key number properties including factors, multiples, primes, squares and cubes. Know how to find the HCF and LCM of two numbers using a listing method. Calculations and problem solving with fractions, including equivalency. Understand basic probability problems involving combined events and experimental probability. Know how to collect and interpret data. Explore the use of budgets, make comparisons to determine best value, and consider financial constraints.	Term 2 core knowledge, skills and retrieval test
	3	Know how to convert between commonly used metric and imperial units, as well as revision of telling time. Round appropriately and apply to calculations. Know the parts of a circle and how to calculate the circumference and area. Retrieve term 2 teaching of algebra and apply to solving equations, whilst appreciating the use of inverse operations.	Term 3 core knowledge, skills and retrieval test
	4	Know how to plot coordinates and draw a straight-line graph from an xy table, retrieving term 2 learning of substitution. Similarly, apply prior knowledge of substitution to generate linear sequences, know how to calculate the nth term rule. Calculate missing angles by learning and knowing key angle facts, where possible extending to extended problem-solving questions.	Term 4 core knowledge, skills and retrieval test. This is open book style with a lesson prior to the assessment focusing on revision skills
	5	Solve problems involving fractions, decimals and percentages (including increase and decrease) and know how to convert between all three. Introduction to interpreting and constructing key statistical charts. Use and know the difference between the three types of averages and the range. Understand the difference between discrete and continuous data. Introduction to proportion and how to form and simplify a ratio.	Formal assessment
	6	Constructing basic shapes using mathematical equipment. Retrieve term 4 knowledge of plotting straight line graphs and use this to plot quadratic graphs. Begin to explore the relationship of y=mx+c. Introduction to Pythagoras' Theorem and calculating the length of a missing hypotenuse in a right-angled triangle.	Term 6 core knowledge, skills and retrieval test
	Term	Key Knowledge – model, practice, assess and retrieve	
Year 8	1	Retrieve knowledge of factors, multiples and primes and use prime factor decomposition to calculate HCF and LCM. Introduction to the basic rules of indices. Further develop knowledge of algebraic expressions and substitution, including forming expressions and substituting into scientific formulae and expanding brackets. Recap knowledge of area and perimeter, expanding to area of a triangle and trapezium and solving algebraic style problems.	Term 1 core knowledge, skills and retrieval test-focus on retrieving Y7 topics
	2	Interpreting and drawing straight line graphs using the equation y=mx+c. Plot quadratic curves and discuss real life modelling. Know the difference between direct and inverse proportion, solve proportion problems and interpret graphs of proportion. Retrieve knowledge of calculating with fractions including with mixed numbers and applying to problem solving questions. Calculate the mean, mode, median and range from a set of data, compare averages and calculate averaged from ungrouped frequency tables.	Term 2 core knowledge, skills and retrieval test
	3	Retrieve knowledge of basic angle facts and start problem solving with angles in parallel lines. Apply angle facts to basic bearing problems. Data interpretation with grouped frequency and misleading charts. Know how to increase and decrease using multipliers and work out a change in value as a percentage increase or decrease.	Term 3 core knowledge, skills and retrieval test
	4	Solve linear equations with brackets and unknowns on both sides, and form and solve linear equations for worded problems. Construct triangles and bisectors using mathematical equipment. Introduction to loci problems. Retrieve calculating area and circumference of circles, extend to semi and quarter circles. Use map scales to find real life distances, draw and measure bearings and draw the plan, side and front view of 3D objects.	Term 4 core knowledge, skills and retrieval test. This is open book style with a lesson prior to the assessment focusing on revision skills
	5	Calculate interior and exterior angles of polygons. Retrieve previously taught knowledge of Pythagoras' theorem and extend to calculating any missing length in a right-angled triangle and contextual problems. Share amounts in a ratio, find the original amount when parts of a ratio are known and simplify ratio in the form 1:n. Retrieve sequence knowledge and apply to pattern problems.	Formal assessment
	6	Calculate the volume of prisms and cylinders, apply to capacity problems. Draw 3D shapes on isometric paper. Understanding probability including sample space diagrams and relative frequency. Know the four conditions of congruency, identify congruent triangles and justify why shapes are congruent. Draw and describe the four types of transformations (including combined questions), stipulating rotations around (0,0) and non-negative enlargements. Introduction to factorising basic linear expressions.	Term 6 core knowledge, skills and retrieval test

	Term	Key Knowledge – model, practice, assess and retrieve	
Year 9	1	Retrieve knowledge of expanding and factorising, extending to double brackets. Know how to solve quadratic equations, including coefficients of x^2. Calculate the area and perimeter of all previously taught shapes, compound shapes and solve algebraic problems.	Term 1 core knowledge, skills and retrieval test
	2	Apply knowledge of fractions and percentages to problem solving questions. Calculate probability using set notation, Venn and tree diagrams. Retrieve all previously taught content on angle facts and solve multistep and algebraic problems, in particular for interior and exterior angles in polygons. Know how and when to apply compound measure formulae.	Term 2 core knowledge, skills and retrieval test
	3	Use standard form to represent large and small numbers. Multiply and divide with standard form. Solve an equation by trial and improvement and change the subject of a simple equation and formula. Apply knowledge of Pythagoras' theorem to 3D problems. Know and use the three trigonometric ratios to find missing sides and angles in right-angled triangles.	Term 3 core knowledge, skills and retrieval test
	4	Identify parallel lines from the equation y=mx+c, draw straight line graphs using the gradient method and interpret and recognise the intersection of two lines on a graph solves simultaneous equations. Recognise a recurring decimal from its fraction and convert simple recurring decimals to fractions. Calculate the median, mode and mean from grouped frequency tables. Draw and interpret cumulative frequency and frequency polygon graphs. Use constructions to represent and solve loci problems.	Term 4 core knowledge, skills and retrieval test. This is open book style with a lesson prior to the assessment focusing on revision skills
	5	Recognise and know how to calculate the nth term rule of a quadratic sequence. Know how to calculate the volume and surface area of prisms and cylinders. Know how to calculate reverse percentages and apply knowledge of multipliers to calculate compound interest. Understand personal finances and compare best buys. Represent inequalities on a number line and graphically, solve linear inequalities.	Formal assessment – GCSE Foundation calculator paper
	6	Introduction of basic circle theorems. Calculations with surds and indices. Know how to express variables in a ratio and algebraically change ratios. Draw and describe all four types of transformations, extending to rotations around any point of rotation, and enlargements with a negative scale factor.	Term 6 in class GCSE Foundation non-calculator paper

Opportunities for developing literacy skills and developing learner confidence and enjoyment in reading	Links to British Values	Links to Careers	Links to Other Personal Development
• Pupils discuss definition and etymology of key words in class. Subsequently pupils will record a glossary of words in their books for reference • Class teachers apply school literacy and marking policy to help support pupils Recommended books: Computer Coding Python Projects for Kids – Carol Voderman Ada Lovelace cracks the code – Jestine Ware Alex's Adventure in Numberland – Alex Bellows The Math Book – Clifford Pickover Infinite Powers: The story of Calculus – Steven Strogatz Storybook Math (simple equations) – Mark Gregory The Simpsons and their mathematical secrets – Simon Singh Sir Cumference and the Dragon of Pi – Cindy Neuschwander The Number Devil – Hans Magnus Enzensberger What's your angle Pythagoras – Julie Ellis Pythagoras: Mathematician and Mystic (Greatest Greek Philosophers) – Louis Coakley and Dimitra Karamanides Infinity and me – Kate Hosford Why do buses come in threes – Rob Eastaway and Jeremy Wyndham Flatterland – Ian Stewart How many socks make a pair – Rob Eastaway Mad for Math: Maths adventures using fractions, percentages and decimals – Linda Betola The Future Architecht's Book – Barbara Beck On the job: First responders: expressions, equations and inequalities – Vickie An	Mutual Respect: • Behave appropriately, allowing all participants the opportunity to work effectively • Take turns and share equipment • Review each other's work respectively • Work collaboratively on problems, help and advise others Democracy: • Statistics: seek to understand what data charts seek to communicate, consider ideas around proportion • Develop understanding of inference, extrapolation and limitations in data Tolerance: • Highlight the evolution of Maths and its reliance on other cultures to develop, illustrating that Maths is a global language • Learn about other faiths in topics such as Islamic art Rule of Law: • Follow safe practice in the classroom • Understand consequence if rules are not followed Individual liberty: • Work within boundaries to make safe choices • Make own choices in data handling activities	• The beginning and end of each new topic presents links to relevant careers for pupils reference – GB4 • Y9 receive a talk from the Bank of England which discusses relevant careers in finance – GB5 • Y7 Receive a trip to Bletchley Park where they learn about the relevance of coding in cybersecurity-GB1/2/8 • Further and higher education opportunities signposted in lessons, newsletters and permanent displays-GB7/8 • Pupils are regularly supported and provided with guidance on necessary grades required for A Levels and subsequent careers-GB3/8	Living in the wider world • Discussions about taxes, mortgages, loans and money management • Knowing how to budget for various life stages. Relationships: • Promotion of women in STEM • Recognition and celebration of Mathematicians of different culture and members of the LGBTQIA+ community who have contributed to the world of Maths • Discussions around gender pay gap and historical reasons for this Health and wellbeing • Managing study and revision time effectively and knowing how to effectively revise in Maths • Recognising new challenges and the importance of resilience • Knowing how and when to access support

Extra-Curricular and Co-Curricular Opportunities	Links with other subjects in the curriculum
• Junior and Intermediate Maths Challenge completed by all pupils in class. Pupils complete practise questions as part of their homework. • Bletchley Park visit in Y7 consolidates learning of Coding and allows opportunity to see modern applications in cyber security • Maths Week activities advertised in lessons and form times • Pi day celebrated in class and through form time activities • National Cypher Challenge • Bank of England Finance Talk in Y9 allows pupils the opportunity to discuss financial Maths and consolidate learning of this topic • Weekly Conundrum distributed in form folders and published via newsletters • Mathswatch available as a revision tool	Art: tessellations, geometry, proportion, area and perimeter and nets Business studies: percentage calculations and data handling/interpretation Geography: statistical charts, scatter graphs, calculating with percentages, ratio and averages, 2D and 3D representation, trigonometry, measures History: use of timelines Music: compound measures and sequences PE: compound measures, calculating with percentages Design and technology: area and perimeter, money problems, calculating with FDP and ratio, representing data English and MFL: etymology of words Drama: 2D and 3D representation for set design Computing: sequences, coding and algorithms

Mathematics Knowledge Sequencing

Key Stage Four Mathematics Curriculum Intent:
- Knowledge to enhance independent learning
- Solve problems through resilience
- Higher level thinking
- Sense of enjoyment and curiosity

Prior Knowledge	At the end of KS4 all pupils will know and do the following: Know and apply algebraic approaches where required Write clear and logical solutions that convey the core mathematical tranches of number, algebra, probability statistics, geometry and measures and ratio, proportion and rates of change Apply a 'common sense' check of solutions to determine their appropriateness
Future Knowledge	Pupils will be exposed to a range of topics that will allow them to consider undertaking Mathematics and/or Further Mathematics at A Level. Additionally, they will be independent learners who can apply their problem-solving skills to other subjects, as well as the wider world.

	Term	Key Knowledge	Assessment Focus
Year 10	1	Retrieve, consolidate and develop basic algebraic skills. Know how to solve linear and quadratic equations through a variety of methods including new techniques such as completing the square and using the quadratic formula. Pupils will know when to use the correct method for solving quadratic equations. Use and rearrange equations and formulae. Retrieve and extend knowledge of ratio-based techniques including scale diagrams and bearings.	Term 1 core knowledge, skills and retrieval test
	2	Retrieve and consolidate linear graph knowledge, extending to calculations with perpendicular lines and coordinate geometry problems. Know and apply rounding techniques and apply to estimation and bound problems. Retrieve and secure knowledge of collecting and representing data, then extend to new techniques such as histograms and boxplots. Draw and interpret scatter graphs and understand correlation and causation. Retrieve and secure knowledge on sequences and apply to problem solving situations.	Term 2 core knowledge, skills and retrieval test. This is open book style with a lesson prior to the assessment focusing on revision skills
	3	Securing previously taught content on percentages, in particular focusing on difference between simple and compound interest. Retrieve knowledge of calculating area and perimeter of previously taught shapes, extend to calculating arc lengths and area of sectors. Know how to calculate the surface area of prisms as well as pyramids and cylinders. Retrieve knowledge of plotting linear and quadratic graphs and apply to real life contexts involving kinematics. Know and sketch cubic, reciprocal and exponential graphs. Secure knowledge of calculating with fractions and decimals.	Term 3 core knowledge, skills and retrieval test
	4	Retrieve and secure knowledge of probability and introduce calculations with the product rule for counting. Retrieve and secure knowledge of Pythagoras' Theorem and trigonometry, applying to contextual problems. Retrieve angle fact knowledge and combine with knowledge of polygon properties to solve geometrical problems including tessellation.	Formal assessments (1 adapted non-calculator Higher GCSE paper and 1 adapted calculator Higher GCSE paper)
	5	Retrieve knowledge of laws od indices and apply this to solving equations involving indices. Know how to add and subtract with standard form, recall how to multiply and divide with standard form and apply in context. Extend knowledge of surds to include rationalising he denominator. Know how to prove conjecture. Know how to evaluate functions as well as confidently work with composite and inverse functions.	In depth formal assessment feedback
	6	Recognise that the intersection of lines on a graph solves simultaneous equations. Know how to solve linear/linear and linear/quadratic simultaneous equations using elimination and substitution as appropriate. Retrieval of circle theorems and extend to allow pupils to know all applicable circle theorems and apply to problems. Know how to interpret inequalities, and know how to solve inequalities graphically and algebraically, including plotting regions. Know how to represent and calculate with vectors, including in geometric proof. Retrieve knowledge of interpreting and constricting statistical charts. Retrieve knowledge of constructions, loci and 2D representations.	Term 6 core knowledge, skills and retrieval test
	Term	Key Knowledge	
Year 11	1	Know how to calculate with algebraic fractions. Retrieve knowledge of calculating with compound measures and know how to convert between all standard units of measure. Know the conditions for congruency and use to prove shapes are congruent. Know how to show shapes are similar using length, area and volume calculations. Retrieve and secure knowledge of transformations. Extend knowledge of trigonometry to include knowing and applying Sine rule, Cosine rule and calculating area of any triangle.	Term 1 core knowledge, skills and retrieval test
	2	Extend knowledge of calculating volumes to include spheres, pyramids and frustums. Retrieving knowledge of probability, extending to calculating with conditional probability, and know when to apply the and/or rule. Apply knowledge of probability to algebraic problems. Retrieve knowledge of direct and inverse proportion, including graphically, and extend to knowing how to calculate the constant of proportionality.	Internal mock examinations (1 adapted non-calculator Higher GCSE paper and 1 adapted calculator Higher GCSE paper). Pupils not securing a grade 5 will complete an in-class Foundation mock to help determine best tier of entry for maximal progress.
	3	Higher: Know how to solve equations using iteration and a formal trial and improvement method. Recognise the equation of a circle and know how to calculate where the centre is (0,0). Gradients. Applying knowledge of linear and quadratic graphs to calculate rates of change. Interpret distance-time and velocity-time graphs. Know and apply graph transformations, including sketching graphs. Combine knowledge of iteration and compound interest to set up and solve growth and decay problems. Foundation: Retrieving knowledge of interpreting and drawing statistical charts, making comparisons of averages and ranges. Retrieve knowledge of working with units of mass, lengths, time and money and apply in context problems.	In depth mock examination feedback

4	Higher and foundation: Targeted revision using Term 2 and Term 4 Mock analysis. This term also allows time to conduct extra timed exam paper sessions to embed and consolidate previously taught content.		Internal mock examinations (1 non-calculator Higher or Foundation GCSE paper and 1 calculator Higher or Foundation GCSE paper) In depth mock examination feedback
5	Higher and foundation: Targeted revision using Term 2 and Term 4 Mock analysis. This term also allows time to conduct extra timed exam paper sessions to embed and consolidate previously taught content. Exam Period		In depth mock examination feedback
6	Exam Period		

Opportunities for developing literacy skills and developing learner confidence and enjoyment in reading	Links to British Values	Links to Careers	Links to Other Personal Development
• Pupils discuss definition and etymology of key words in class. Subsequently pupils will record a glossary of words in their books for reference • Class teachers apply school literacy and marking policy to help support pupils Recommended books: Alex's Adventure in Numberland – Alex Bellows The Math Book – Clifford Pickover Infinite Powers: The story of Calculus – Steven Strogatz The Simpsons and their mathematical secrets – Simon Singh The Number Devil – Hans Magnus Enzensberger What's your angle Pythagoras – Julie Ellis Infinity and me – Kate Hosford Why do buses come in threes – Rob Eastaway and Jeremy Wyndham Flatterland – Ian Stewart How many socks make a pair – Rob Eastaway Mad for Math: Maths adventures using fractions, percentages and decimals – Linda Betola The Future Architecht's Book – Barbara Beck On the job: First responders: expressions, equations and inequalities – Vickie An	Mutual Respect: • Behave appropriately, allowing all participants the opportunity to work effectively • Take turns and share equipment • Review each others work respectively • Work collaboratively on problems, help and advise others Democracy: • Statistics: seek to understand what data charts seek to communicate, consider ideas around proportion • Develop understanding of inference, extrapolation and limitations in data Tolerance: • Highlight the evolution of Maths and its reliance on other cultures to develop, illustrating that Maths is a global language • Learn about other faiths in topics such as Islamic art Rule of Law: • Follow safe practice in the classroom • Understand consequence if rules are not followed Individual liberty: • Work within boundaries to make safe choices • Make own choices in data handling activities	• The beginning and end of each new topic presents links to relevant careers for pupils reference – GB4 • Further and higher education opportunities signposted in lessons, newsletters and permanent displays- GB7/8 • Pupils are regularly supported and provided with guidance on necessary grades required for A Levels and subsequent careers-GB3/8	Living in the wider world • Discussions about taxes, mortgages, loans and money management • Knowing how to budget for various life stages. Relationships: • Promotion of women in STEM • Recognition and celebration of Mathematicians of different culture and members of the LGBTQIA+ community who have contributed to the world of Maths • Discussions around gender pay gap and historical reasons for this Health and wellbeing • Managing study and revision time effectively and knowing how to effectively revise in Maths • Recognising new challenges and the importance of resilience • Knowing how and when to access support

Extra-Curricular and Co-Curricular Opportunities	Links with other subjects in the curriculum
• Intermediate and Senior Maths Challenge completed by all pupils in class • Maths Week activities advertised in lessons and form times • Pi day celebrated in class and through form time activities • National Cypher Challenge • Weekly Conundrum distributed in form folders and published via newsletters • Mathswatch available as a revision tool	Art: tessellations, geometry, proportion, area and perimeter and nets Business studies: percentage calculations and data handling/interpretation Geography: statistical charts, scatter graphs, calculating with percentages, ratio and averages, 2D and 3D representation, trigonometry, measures History: use of timelines Music: compound measures and sequences PE: compound measures, calculating with percentages Design and technology: area and perimeter, money problems, calculating with FDP and ratio, representing data English and MFL: etymology of words Drama: 2D and 3D representation for set design Computing: sequences, coding and algorithms

Mathematics Knowledge Sequencing

Key Stage Five Mathematics Curriculum Intent:
- Knowledge to enhance independent learning
- Solve problems through resilience
- Higher level thinking
- Sense of enjoyment and curiosity

Prior Knowledge	All Key Stage 5 pupils will build on the core mathematical tranches learnt at GCSE: number, algebra, probability statistics, geometry and measures and ratio, proportion and rates of change
Future Knowledge	The Key Stage 5 curriculum prepares pupils to become independent learners capable of applying their knowledge to a range of problem-solving situations. They will be able to study degrees containing high levels of maths content as well as highly attractive careers in industries such as engineering and Medicine.

	Term	Key Knowledge	Assessment Focus
Year 12	1	Pupils will retrieve key skills and knowledge from GCSE, in particular focussing on algebraic expressions, quadratics, solving equations, inequalities, graphs and transformations and coordinate geometry.	Suitability test week 2 of term. Opportunity to conduct unit 1 and 2 topic tests
	2	Pupils will be introduced to new A Level specific knowledge including algebraic methods (including proof) and binomial expansion. Pupils will retrieve knowledge of trigonometry and extend this to know how to work with trigonometric identities and solve trigonometric equations.	Formal assessment of term 1 content. Opportunity to conduct unit 3 and 4 topic tests.
	3	Further introduction of key skills required for A Level, including knowing how and when to use differentiation and integration, solve geometrical problems with vectors and how to problem solve with exponentials and logarithms.	Opportunity to conduct unit 5, 6, 7 and 8 topics tests.
	4	Having completed all of the year 1 Pure content pupils commence the Applied content this term. Pupils extend their knowledge of statistics and probability from GCSE to know how to analyse statistical sampling, data presentations and interpretation, as well as problem solve with probability. Pupils are introduced to Mechanics and will know how to problem solve with constant acceleration (SUVAT equations) and when working with forces.	Opportunity to conduct Statistics unit 1,2 and 3 topic tests. Opportunity to conduct Mechanics unit 6, 7 and 8 topics tests.
	5	Pupils continue to focus on Applied content. In statistics they are introduced to working with statistical distributions and will know how to use and interpret hypothesis testing. In Mechanics pupils will know how to calculate problems with variable acceleration and resolving forces. Following the mock period pupils will spend at least a week completing in depth mock repair work.	Mock examinations – pupils complete a pure AS paper. In class resit for all pupils achieving grade E and below.
	6	Pupils will further develop their understanding of algebraic methods by knowing how to calculate with algebraic and partial fractions. Retrieve knowledge of proof from year 1 and know further formal methods of proof. Retrieve knowledge of vectors and apply in three dimensions. Pupils will be introduced to calculating with radians and further develop their understanding of trigonometric functions.	Formal assessment of AS Pure content. Opportunity to conduct unit 1, 2, and 12 topic tests

	Term	Key Knowledge	
Year 13	1	Pupils will retrieve their knowledge of trigonometry and apply this to modelling problems. Knowledge of binomial expansion will be retrieved from term 1 and further extended and embedded. Time will be spent focussing on working with arithmetic and geometric sequences and their applications. The topic of differentiation will be extended to include application of the chain rule, product rule and quotient rule; differentiation will also crossover to the study of parametric equations.	Opportunity to conduct unit 4, 5, 6 and 7 topic tests
	2	The study of differentiation continues with pupils knowing how to differentiate implicitly, use second order derivatives and calculate rates of change. Following on from differentiation pupils will apply their knowledge to study the reverse process of integration, whilst appreciating some functions are more difficult than others to integrate. Know how to work with functions and model appropriately. Pupils will know how to solve equations using iterative processes and by using the Newton-Raphson method.	Formal assessment of AS Applied content. In class Pure AS paper to complete one full series for use in predicting grades and UCAS applications.
	3	Following the completion of the Y2 Pure content pupils return to the study of Applied Maths. In Statistics they will explore regression, correlation and how to use and apply the normal distribution. In Mechanics pupils will be introduced to calculating with moments and revisit calculating with forces and extend to applying with angles. Additionally, pupils will investigate applications of kinematics.	Mock examinations – pupils complete a pure A Level paper. Opportunity to conduct Statistics unit 1 – 5 topic tests and Mechanics unit 4-9 topic tests.
	4	In term 4 for Statistics pupils will consolidate their understanding and application of the normal distribution. For Mechanics pupils continue to apply their knowledge of forces and kinematics in problem solving questions. Following the mock period pupils will spend at least a week completing in depth mock repair work.	Mock examinations – pupils complete a pure A Level paper. Opportunity to conduct Statistics unit 1 – 5 topic tests and Mechanics unit 4-9 topic tests.
	5	Targeted revision using Term 3 and Term 4 Mock analysis. This term also allows time to conduct extra timed exam paper sessions to embed and consolidate previously taught content.	In class Applied and Pure A Level papers

6	Exam Period

Opportunities for developing literacy skills and developing learner confidence and enjoyment in reading	Links to British Values	Links to Careers	Links to Other Personal Development
- Pupils discuss definition and etymology of key words in class. Subsequently pupils will record a glossary of words in their books for reference - Class teachers apply school literacy and marking policy to help support pupils Recommended books: Alex's Adventure in Numberland – Alex Bellows The Math Book – Clifford Pickover Infinite Powers: The story of Calculus – Steven Strogatz The Simpsons and their mathematical secrets – Simon Singh The Number Devil – Hans Magnus Enzensberger What's your angle Pythagoras – Julie Ellis Infinity and me – Kate Hosford Why do buses come in threes – Rob Eastaway and Jeremy Wyndham Flatterland – Ian Stewart How many socks make a pair – Rob Eastaway Mad for Math: Maths adventures using fractions, percentages and decimals – Linda Betola The Future Architecht's Book – Barbara Beck On the job: First responders: expressions, equations and inequalities – Vickie An	Mutual Respect: - Behave appropriately, allowing all participants the opportunity to work effectively - Take turns and share equipment - Review each others work respectively - Work collaboratively on problems, help and advise others Democracy: - Statistics: seek to understand what data charts seek to communicate, consider ideas around proportion - Develop understanding of inference, extrapolation and limitations in data Tolerance: - Highlight the evolution of Maths and its reliance on other cultures to develop, illustrating that Maths is a global language - Learn about other faiths in topics such as Islamic art Rule of Law: - Follow safe practice in the classroom - Understand consequence if rules are not followed Individual liberty: - Work within boundaries to make safe choices - Make own choices in data handling activities	- The beginning and end of each new topic presents links to relevant careers for pupils reference – GB4 - Higher education opportunities signposted in lessons, newsletters and permanent displays-GB7/8 - Pupils are regularly supported and provided with guidance on necessary grades required for University courses and subsequent careers-GB3/8	Living in the wider world - Discussions about taxes, mortgages, loans and money management - Knowing how to budget for various life stages. Relationships: - Promotion of women in STEM - Recognition and celebration of Mathematicians of different culture and members of the LGBTQIA+ community who have contributed to the world of Maths - Discussions around gender pay gap and historical reasons for this Health and wellbeing - Managing study and revision time effectively and knowing how to effectively revise in Maths - Recognising new challenges and the importance of resilience - Knowing how and when to access support

Extra-Curricular and Co-Curricular Opportunities	Links with other subjects in the curriculum
- Senior Maths Challenge completed by all pupils in class - Maths Week activities advertised in lessons and form times - Pi day celebrated in class and through form time activities - National Cypher Challenge - Weekly Conundrum distributed in form folders and published via newsletters - Mathswatch and IntegralMaths available as a revision tool - Pupils offered the opportunity to accompany Y7 trip to Bletchley Park - University lectures and newsletters published on display board and in newsletter	Art: tessellations, geometry, proportion, area and perimeter and nets Business studies: percentage calculations and data handling/interpretation Geography: statistical charts, scatter graphs, calculating with percentages, ratio and averages, 2D and 3D representation, trigonometry, measures History: use of timelines Music: compound measures and sequences PE: compound measures, calculating with percentages Design and technology: area and perimeter, money problems, calculating with FDP and ratio, representing data English and MFL: etymology of words Drama: 2D and 3D representation for set design Computing: sequences, coding and algorithms

Mathematics Knowledge Sequencing

Key Stage Five Further Mathematics Curriculum Intent:
- Knowledge to enhance independent learning
- Solve problems through resilience
- Higher level thinking
- Sense of enjoyment and curiosity

Prior Knowledge	All Key Stage 5 pupils will build on the core mathematical tranches learnt at GCSE: number, algebra, probability statistics, geometry and measures and ratio, proportion and rates of change
Future Knowledge	The Key Stage 5 curriculum prepares pupils to become independent learners capable of applying their knowledge to a range of problem-solving situations. They will be able to study degrees containing high levels of maths content as well as highly attractive careers in industries such as engineering and Medicine.

	Term	Key Knowledge	Assessment Focus
Year 12 Further Mathematics	1	Pupils will retrieve key skills and knowledge from GCSE, in particular focussing on algebraic expressions, quadratics, solving equations, inequalities, graphs and transformations and coordinate geometry. Pupils will be introduced to new A Level specific knowledge including algebraic methods (including proof) and binomial expansion. Pupils will retrieve knowledge of trigonometry and extend this to know how to work with trigonometric identities and solve trigonometric equations.	Suitability test week 2 of term. Opportunity to conduct unit 1, 2, 3 and 4 topic tests
	2	Further introduction of key skills required for A Level, including knowing how and when to use differentiation and integration, solve geometrical problems with vectors and how to problem solve with exponentials and logarithms. Pupils are introduced to Mechanics and will know how to problem solve with constant acceleration (SUVAT equations) and when working with forces. They also extend their knowledge of statistics and probability from GCSE to know how to analyse statistical sampling, data presentations and interpretation, as well as problem solve with probability	Formal assessment of term 1 content. Opportunity to conduct unit 5, 6, 7 and 8 topic tests Opportunity to conduct Mechanics unit 6 topic test Opportunity to conduct Statistics unit 1,2 and 3 topic tests
	3	Pupils are introduced to Mechanics and will know how to problem solve with constant acceleration (SUVAT equations) and when working with forces. Pupils will further develop their understanding of algebraic methods by knowing how to calculate with algebraic and partial fractions. Retrieve knowledge of proof from year 1 and know further formal methods of proof. Retrieve knowledge of vectors and apply in three dimensions	Opportunity to conduct Mechanics unit 7 and 8 topics tests.
	4	In term 4 for Statistics pupils will consolidate their understanding and application of the normal distribution. For Mechanics pupils continue to apply their knowledge of forces and kinematics in problem solving questions. Pupils will be introduced to calculating with radians and further develop their understanding of trigonometric functions.	Opportunity to conduct Statistics unit 1 – 5 topic tests and Mechanics unit 4-9 topic tests.
	5	Pupils will retrieve their knowledge of trigonometry and apply this to modelling problems. Knowledge of binomial expansion will be retrieved from AS Pure and further extended and embedded. Time will be spent focussing on working with arithmetic and geometric sequences and their applications. The topic of differentiation will be extended to include application of the chain rule, product rule and quotient rule; differentiation will also crossover to the study of parametric equations. Further develop integration & differentiation skills, including connected rates of change and links to real life problems for differentiation	Mock examinations – A Level Pure content and Core Pure covered so far In class resit for all pupils achieving grade E and below.
	6	Introducing the key skills and knowledge for Core Pure Further Maths, including complex numbers, argand diagrams. Use integration to find and understand volumes of revolution. Pupils are introduced to Decision Mathematics, investigating Algorithms and graph theory. They also look at Minimum connectors (spanning trees) Dijkstra's algorithm and Floyd's algorithm.	Formal assessment of A Level Pure content and Core Pure covered so far Opportunity to conduct unit 1, 2, and 12 topic tests
	Term	Key Knowledge	
Year 13 Further Mathematics	1	Develop understanding of matrices and linear transformations. Differing forms of mathematical Proof and the range of techniques for mathematical induction Introduce further methods of calculus for both differentiation and integration. Further work on series to include Maclaurin series. In Decision pupils study the Route inspection and Travelling salesman problems.	Opportunity to conduct relevant unit topic tests
	2	Work on developing students understanding of calculus, further investigate volumes of revolutions problems. Introduce hyperbolic functions and investigate vectors further. In Decision pupils meet Linear Programming: Formulation of problems, Graphical solutions and the Simplex algorithm, also Big-M and two-stage Simplex	Formal assessment of A Level Pure content In class A Level Applied paper to complete one full series for use in predicting grades and UCAS applications.
	3	Extend understanding of complex numbers with De Moivres theorem and series. Introduce the idea of polar co-ordinates and apply the use of calculus. Further work on core pure with an introduction to solving and modelling with 1st and 2nd order differential equations. In Decision pupils study Critical path analysis. They also start Decision 2 looking at allocation and transportation problems.	Mock examinations – pupils complete a combination of pure, core, applied and decision content covered so far

4	Modelling with differential equations to solve real world problems. In Decision pupils study Flows in Networks, Dynic Programming and Game Theory.		Mock examinations – pupils complete a combination of pure, core, applied and decision content covered so far
5	Targeted revision using Term 3 and Term 4 Mock analysis. This term also allows time to conduct extra timed exam paper sessions to embed and consolidate previously taught content.		In class Applied and Pure A Level papers
6	Exam Period		

Opportunities for developing literacy skills and developing learner confidence and enjoyment in reading	Links to British Values	Links to Careers	Links to Other Personal Development
• Pupils discuss definition and etymology of key words in class. Subsequently pupils will record a glossary of words in their books for reference • Class teachers apply school literacy and marking policy to help support pupils Recommended books: Alex's Adventure in Numberland – Alex Bellows The Math Book – Clifford Pickover Infinite Powers: The story of Calculus – Steven Strogatz The Simpsons and their mathematical secrets – Simon Singh The Number Devil – Hans Magnus Enzensberger What's your angle Pythagoras – Julie Ellis Infinity and me – Kate Hosford Why dio buses come in threes – Rob Eastaway and Jeremy Wyndham Flatterland – Ian Stewart How many socks make a pair – Rob Eastaway Mad for Math: Maths adventures using fractions, percentages and decimals – Linda Betola The Future Architecht's Book – Barbara Beck On the job: First responders: expressions, equations and inequalities – Vickie An	Mutual Respect: • Behave appropriately, allowing all participants the opportunity to work effectively • Take turns and share equipment • Review each others work respectively • Work collaboratively on problems, help and advise others Democracy: • Statistics: seek to understand what data charts seek to communicate, consider ideas around proportion • Develop understanding of inference, extrapolation and limitations in data Tolerance: • Highlight the evolution of Maths and its reliance on other cultures to develop, illustrating that Maths is a global language • Learn about other faiths in topics such as Islamic art Rule of Law: • Follow safe practice in the classroom • Understand consequence if rules are not followed Individual liberty: • Work within boundaries to make safe choices • Make own choices in data handling activities	• The beginning and end of each new topic presents links to relevant careers for pupils reference – GB4 • Higher education opportunities signposted in lessons, newsletters and permanent displays-GB7/8 • Pupils are regularly supported and provided with guidance on necessary grades required for University courses and subsequent careers-GB3/8	Living in the wider world • Discussions about taxes, mortgages, loans and money management • Knowing how to budget for various life stages. Relationships: • Promotion of women in STEM • Recognition and celebration of Mathematicians of different culture and members of the LGBTQIA+ community who have contributed to the world of Maths • Discussions around gender pay gap and historical reasons for this Health and wellbeing • Managing study and revision time effectively and knowing how to effectively revise in Maths • Recognising new challenges and the importance of resilience • Knowing how and when to access support

Extra-Curricular and Co-Curricular Opportunities	Links with other subjects in the curriculum
• Senior Maths Challenge completed by all pupils in class • Maths Week activities advertised in lessons and form times • Pi day celebrated in class and through form time activities • National Cypher Challenge • Weekly Conundrum distributed in form folders and published via newsletters • Mathswatch and IntegralMaths available as a revision tool • Pupils offered the opportunity to accompany Y7 trip to Bletchley Park • University lectures and newsletters published on display board and in newsletter	Art: tessellations, geometry, proportion, area and perimeter and nets Business studies: percentage calculations and data handling/interpretation Geography: statistical charts, scatter graphs, calculating with percentages, ratio and averages, 2D and 3D representation, trigonometry, measures History: use of timelines Music: compound measures and sequences PE: compound measures, calculating with percentages Design and technology: area and perimeter, money problems, calculating with FDP and ratio, representing data English and MFL: etymology of words Drama: 2D and 3D representation for set design Computing: sequences, coding and algorithms