

## Maths

### KS2

- Topic 1 - Algebra
- Topic 2 - Number
- Topic 3 - Geometry
- Topic 4 - Statistics

### Year 7

#### Autumn

- Topic 1 – Calculator work – Increasing familiarity with basic calculator functions and symbols
- Topic 2 - Ordering positive, negative integers and decimals – understanding place value and ordering and comparing negative number using inequalities
- Topic 3 - Rounding and estimating – rounding to the nearest decimal place and significant figures and using this to estimate calculations
- Topic 4 - Calculations with negative, decimals and whole numbers – multiplying and dividing negative numbers
- Topic 5 - Square, cube and higher powers, Bidmas, LCM HCF – Understanding powers and using it in conjunction with BIDMAS; identifying prime numbers, multiples and factors and using this to find the lowest common multiple and highest common factor
- Topic 6 - Algebraic notation - Manipulating with algebraic expressions and terms
- Topic 7 - Substituting into formula – substituting values into a given formula or expression

#### Spring

- Topic 8 - Perimeter and area of simple and compound shapes – Calculating the perimeter and area of 2D shapes
- Topic 9 - Surface area and volume – calculate the surface area and volume of 3D Shapes
- Topic 10 - Working with fractions – Representing fractions graphically and expressing quantities as fractions
- Topic 11 – Equivalence – simplifying fractions and calculating fractions with all 4 operations; converting between fractions and decimals
- Topic 12 - Value of amount - finding fraction and percentage of an amount
- Topic 13 - Probability – Understanding events in probability and learning to predict outcomes based on experimental probability

#### Summer

- Topic 14 – Set notation – understanding sets and its relation to Venn diagrams
- Topic 15 - Solving one and two steps equations – finding the value of an unknown using the balancing method
- Topic 16 - Further work with equations – forming and solving equation based on a given context
- Topic 17 - Calculating with angles – Calculating angles on a straight line, around a point, in triangles and quadrilaterals; working with angles in parallel lines
- Topic 18 - Constructing triangles – using compasses, protractors and rulers to construct triangles
- Topic 19 - Working with transformations – learning to manipulate shapes through translation, reflection, rotation and enlargement; understanding congruency

### Year 8

#### Autumn

- Topic 1 - Ratio and scale – Solving problems involving ratios, dividing ratios into amounts, scale drawings and perimeter of a circle
- Topic 2 - Multiplicative change – Proportion, conversion graphs and currencies, scale factors and similar shapes
- Topic 3 - Multiplying and dividing fractions – Multiplying and dividing fractions by integers, Multiplying and dividing fractions by a fraction
- Topic 4 - Working in the Cartesian plane – Understanding coordinates and problems involving straight line graphs
- Topic 5 - Representing data – Draw and interpret Pie charts, bars charts, scatter diagrams, frequency table and two-way tables
- Topic 6 – Tables & Probability – Set notation, Venn Diagrams and finding Probabilities

#### Spring

- Topic 7 - Brackets, equations and inequalities – Algebraic notation, multiplying and factorising expressions, solving equations and inequalities
- Topic 8 - Sequences – One step and two step function machines, general rules and algebraic sequences
- Topic 9 - Indices – Understanding and applying the basic rules of Indices
- Topic 10 - Fractions and percentages 1 – Calculating changes in percentages through calculator and non-calculator methods
- Topic 11 - Fractions and percentages 2 – Calculating original amounts based on a given percentage change
- Topic 12 - Standard index form – converting large and small numbers to standard form; calculating with standard form
- Topic 13 - Number sense – using number and algebraic facts to make derivations; calculating with money and different units or measurement.

#### Summer

- Topic 14 - Angles in parallel lines and polygons – investigating and using angles in parallel lines; deriving the interior and exterior angles in polygons and using them in calculations
- Topic 15 - Area of trapezia and circles – calculating angles in a trapezium, circle and circle sectors
- Topic 16 - Line symmetry and reflection – Identifying symmetry in 2D shapes and reflecting in mirror lines
- Topic 17 - Measures of location – calculating averages from a list and from a table
- Topic 18 - Measures of location – Understanding and identifying outliers on distributions
- Topic 19 - The data handling cycle – drawing and interpreting different types of statistical diagrams

### Year 9

#### Aspiring 9 and 8 – Autumn

- Topic 1 - Indices and standard form - Use negative and fractional indices, Write a number in standard form
- Topic 2 - Expressions and Formulae – Solve equations, Use and rearrange formulae
- Topic 3 – Data – Calculating averages
- Topic 4 – Multiplicative reasoning – Calculate percentage increase and decrease
- Topic 5 – Constructions - Construct a perpendicular bisector.
- Topic 6 – Sequences, inequalities, equations and proportion – Calculate the nth term for a sequence

#### Spring

- Topic 7 - Circles, Pythagoras and prisms – Calculate the area of a circle and use Pythagoras's theorem

- Topic 8 – Graphs – Graph Linear and Quadratic equations.
- Topic 9 – Comparing shapes – Know how to define Congruent and Similar shapes
- Topic 10 – Probability – Calculate probabilities of mutually exclusive events and Venn Diagrams

#### Summer

- Topic 11 – Number – Calculating with surds
- Topic 12 – Algebra – Expanding and factorising algebraic expressions
- Topic 13 – Interpreting and representing data - Using and understanding scatter graphs

#### Aspiring 6 and 7 – Autumn

- Topic 1 – Statistics – Creating and using two-way tables
- Topic 2 – Number – Rounding and estimating
- Topic 3 – Number - Writing numbers as a product of their prime factors
- Topic 4 – Number – Calculating with fractions and ratios.
- Topic 5 – Number – Calculating and solving problems with proportion (direct and indirect)
- Topic 6 – Number – Calculating percentage increase and decrease

#### Spring

- Topic 7 – Algebra – Expand and simplify expressions including double brackets.
- Topic 8 – Algebra – Substitute into formula and solve equations
- Topic 9 - Number – Using and writing numbers in standard form
- Topic 10 – Geometry – Calculating missing angles in polygons
- Topic 11 – Geometry – Constructing triangles

#### Summer

- Topic 12 – Geometry – Knowing and using Pythagoras and Trigonometry formulae
- Topic 13 – Geometry – Finding volumes and surface areas of prisms
- Topic 14 – Data – Calculating averages
- Topic 12 – Statistics – Plotting graphs from data
- Topic 13 – Algebra – Understanding gradients and y-intercepts of straight line graphs.

#### Aspiring 5 – Autumn

- Topic 1 – Number - Four operations with Decimals.
- Topic 2 – Number – Working with factors and multiples, squares and cube roots
- Topic 3 - Algebra - Simplifying expressions
- Topic 4 – Algebra – Expanding and factorising expressions
- Topic 5 – Data – Using and creating and two-way tables and scatter graphs.

#### Spring

- Topic 4 – Number – Four operations with Fractions
- Topic 5 – Number – Calculating with percentages.
- Topic 6 – Algebra – Solving equations
- Topic 7 – Algebra – Solving inequalities and finding the nth term of a sequence

#### Summer

- Topic 8 – Angles – Finding angles between parallel lines
- Topic 9 – Averages and range – Calculating averages for data sets.
- Topic 10 – Perimeter area and volume – Finding areas of polygons and Volumes of prisms.

#### Aspiring 4 – Autumn

- Topic 1 – Calculations – Calculating with order of operations and using a calculator
- Topic 2 – Fractions, percentages and decimals – Calculating with FDP
- Topic 3 – Number – Calculating with ratio and dividing in a given ratio
- Topic 4 – Equations – Solving equations

- Topic 5 – Number – Working with multiples and factors
- Topic 6 – Number – Using square numbers and square roots.

#### Spring

- Topic 7 – Algebra – Collecting like terms
- Topic 8 - Geometrical reasoning – Finding angles in triangles
- Topic 9 – Geometry – Solving problems with properties of shapes.
- Topic 10 – Area and Volume – Finding areas of polygons and volumes of cuboids.
- Topic 11 – Graphs – Plotting straight line graphs
- Topic 12 - Probability – find the probability of mutually exclusive events

#### Summer

- Topic 1 – Number – Rounding and calculating with decimals
- Topic 2 – Number – Calculating with factors and multiples
- Topic 2 - Algebra – Simplifying expressions
- Topic 3 – Graphs and Tables – Creating graphs from data and using stem and leaf diagrams

### Year 10

#### Aspiring 9&8 – Autumn

- Topic 1 - Fractions, ratio and Percentages – Solving problems involving fractions and percentages
- Topic 2 – Angles and Trigonometry – Using angles facts and Pythagoras's theorem
- Topic 3 – Graphs – Drawing Quadratic, Cubic and reciprocal graphs
- Topic 4 – Area and Volume – Finding areas and volumes of various shapes and solids.

#### Spring

- Topic 5 – Transformations and constructions – Rotating, Reflecting, Translating and Enlarging shapes.
- Topic 6 – Equations and inequalities – Solving quadratics equations
- Topic 7 – Probability – Find the probability of combined events
- Topic 8 – Multiplicative reasoning – Calculating growth and decay

#### Summer

- Topic 9 – Similarity and Congruence – Proving congruence
- Topic 10 – More Trigonometry – Graphing Sine, Cosine and Tangent functions
- Topic 11 – Further Statistics – Drawing and using histograms.
- Topic 12 – Equations and Graphs – Solving simultaneous equations graphically.

#### Extension

- Topic 13 - Matrices – Multiplying matrices
- Topic 14 – Calculus – Differentiating simple functions.

#### Aspiring 6 and 7 – Autumn

- Topic 1 – Algebra – Plotting quadratic graphs and finding roots
- Topic 2 – Compound Measures – Calculating with speed, density and pressure.
- Topic 3 – Transformations – Reflecting, Rotating, Translating and Enlarging shapes.
- Topic 4 – Vectors – Calculating with vectors
- Topic 5 – Probability – Calculating probabilities using Tree and Venn diagrams

#### Spring

- Topic 8 - Algebra – Solving simultaneous equations
- Topic 9 – Algebra – Drawing quadratic graphs
- Topic 10 – Data – Averages from a table
- Topic 11 – Grade 4 and 5 Topics revision
- Topic 12 – Number – Calculating repeated percentage change.
- Topic 13 – Algebra – Expanding triple brackets.

## Summer

- Topic 14 – Algebra – Completing the square
- Topic 15 – Geometry – Using Circle theorems
- Topic 16 – Statistics – Creating and using box plots
- Topic 17 – Number – Calculating with surds and bounds
- Topic 18 – Algebra - Rearranging formula

## Aspiring 5 – Autumn

- Topic 1 – Graphs – Plotting linear graphs and real life graphs
- Topic 2 – Transformations – Reflecting, Rotating, Translating and Enlarging shapes
- Topic 3 – Ratio and proportion – Using and comparing ratios
- Topic 4 – Right angles triangles – Using Pythagoras theorem

## Spring

- Topic 5 – Trigonometry – Using the Sine, Cosine and Tangent ratios
- Topic 6 – Probability – Calculating probabilities of two events
- Topic 7 – Multiplicative reasoning – Calculating with direct and inverse proportion
- Topic 8 – Construction and Loci – Creating accurate drawings and finding regions with loci.

## Summer

- Topic 9 – Angles - Finding bearings
- Topic 10 – Review of the year's learning

## Aspiring 4 – Autumn

- Topic 1 – Graphs and tables – Creating pie charts
- Topic 2 – Fractions and percentages – Using four operations with fractions and calculating percentages
- Topic 3 – Algebra – Solving equations
- Topic 4 – Algebra – finding inequalities and generating sequences
- Topic 5 – Angles – finding angles in parallel lines

## Spring

- Topic 5 – Averages and range – Calculating Mean, Mode, Median and range
- Topic 6 – Perimeter area and volume – Finding areas of compound shapes
- Topic 7 – Graphs – Using the equation of a line to plot a graph
- Topic 8 – Transformations – Rotating, Reflecting, Translating and Enlarging shapes

## Summer

- Topic 9 – Ratio and proportion – Using ratio to solve problems
- Topic 10 – Right angles triangles – Using Pythagoras theorem
- Topic 11 – Probability – Calculating probabilities from Venn and tree diagrams.

## Year 11

### Aspiring 9 and 8

- Topic 1 – Circle Theorems – Applying Circle Theorems to solve problems.
- Topic 2 – More Algebra – Rearranging formulae
- Topic 3 – Vectors and geometric proof – Finding parallel vectors and using vectors to prove geometric facts.
- Topic 4 – Proportion and graphs – Calculating direct and indirect proportion.

### Extension

- Topic 5 – FM Number and algebra – Simplifying algebraic fractions
- Topic 6 – FM Algebra - Using the binomial expansion
- Topic 7 – FM Coordinate geometry – Finding parallel and perpendicular lines

### Aspiring 5 – Autumn

- Topic 1 – Quadratic equations and graphs
- Topic 2 – Perimeter, area and volume
- Topic 3 – Fractions, indices and standard form
- Topic 4 – Congruence, similarity and vectors

### Spring

- Topic 5 – more algebra

### Aspiring 4 – Autumn

- Topic 1 – Multiplicative reasoning
- Topic 2 – Construction, loci and bearing
- Topic 3 – Quadratic equations and graphs
- Topic 4 – Perimeter, area and volume
- Topic 5 – Fractions, indices and standard form

### Spring

- Topic 6 – Congruence, similarity and vectors

### Spring

- Topic 7 – more algebra

## Year 12 – Single Maths – AS in Year 1

### Half Term 1:

- Algebraic Expressions – Understand and use the laws of indices
- Quadratics – Work with quadratic functions and their graphs
- Equations and Inequalities – Solve linear and quadratic simultaneous equations and inequalities
- Straight Line Graphs – Understand and use the equation of a straight line
- Graphs and Transformations – Apply transformations to quadratics, cubics, reciprocals and trigonometric graphs.
- Circles – Complete the square to find the centre and radius of a circle

### Half Term 2:

- Algebraic Methods – Proof by deduction, exhaustion, and counter example
- Trigonometric Ratios – Use Sine, Cosine and Tangent ratios
- Trigonometric Identities and Equations – Use trigonometric Identities to solve equations
- Binomial Expansion – Expand  $(a + bx)^n$
- Vectors – use vectors in 2D

### Half Term 3:

- Differentiation – Know that  $dy/dx$  is the rate of change of  $y$  with respect to  $x$ .
- Integration - The reverse process of differentiation and area under a curve.
- Exponentials and Logarithms- Use the functions  $a^x$  and  $e^x$  and their graphs.
- Statistics – Data Collection – What is a census and sample?
- Statistics – Measures of Location and Spread – Interpret measures for discrete and continuous data
- Statistics – Representation of Data – Histograms, frequency polygons, box and whisker plots and cumulative frequency diagrams.

### Half Term 4:

- Mechanics – Constant Acceleration – Use and interpret graphs in kinematics
- Statistics – Correlation - Interpolate and extrapolate for bivariate data
- Statistics – Probability – Mutually exclusive and independent events

- Statistics – Statistical Distributions – Use Binomial distribution to model real-world situations

#### Half Term 5:

- Mechanics – Forces and Motion – Newton’s first law.
- Mechanics – Variable Acceleration – Use calculus in kinematics
- Statistics – Statistical Distributions – Use Binomial distribution to model real-world situations
- Statistics – Hypothesis Testing – Understand and apply language of hypothesis testing

#### Half Term 6:

- A2 – Algebraic Methods - Proof by contradiction
- A2 – Functions and Graphs - Understand modulus functions and asymptotes

### Year 12 – Further Maths

#### Half Term1:

- Algebraic Expressions – Understand and use the laws of indices
- Quadratics – Work with quadratic functions and their graphs
- Equations and Inequalities – Solve linear and quadratic simultaneous equations and inequalities
- Straight Line Graphs – Understand and use the equation of a straight line
- Graphs and Transformations – Apply transformations to quadratics, cubics, reciprocals and trigonometric graphs.
- Circles – Complete the square to find the centre and radius of a circle
- Algebraic Methods – Proof by deduction, exhaustion and counter example
- Trigonometric Ratios – Use Sine, Cosine and Tangent ratios
- Trigonometric Identities and Equations – Use trigonometric Identities to solve equations
- Binomial Expansion – Expand  $(a + bx)^n$
- Vectors – use vectors in 2D

#### Half Term2:

- Differentiation – Know that  $dy/dx$  is the rate of change of  $y$  with respect to  $x$ .
- Integration – The reverse process of differentiation and area under a curve.
- Exponentials and Logarithms- Use the functions  $a^x$  and  $e^x$  and their graphs.
- Statistics – Data Collection – What is a census and sample?
- Statistics – Measures of Location and Spread – Interpret measures for discrete and continuous data
- Mechanics – Constant Acceleration – Use and interpret graphs in kinematics
- Mechanics – Forces and Motion – Newton’s first law.

#### Half Term 3:

- A2 – Algebraic Methods – Proof by contradiction
- A2 – Functions and Graphs - Understand modulus functions and asymptotes
- A2 – Binomial Expansion - For what range of values is an expansion valid for?
- A2 – Sequences and Series – Increasing, decreasing and periodic sequences
- Mechanics – Variable Acceleration – Use calculus in kinematics
- Statistics – Representation of Data – Histograms, frequency polygons, box and whisker plots and cumulative frequency diagrams.
- Statistics – Correlation – Interpolate and extrapolate for bivariate data

#### Half Term 4:

- A2 – Radians – Areas of sectors and lengths of arcs
- A2 – Parametric Equations – Convert between cartesian and parametric equations
- A2 -Differentiation – Use the 2<sup>nd</sup> derivatives, chain, product and quotient rules.
- A2 – Trigonometric Functions – Understand and use Secant, Cosecant and Cotangent
- A2 – Trigonometric Modelling – Solve trigonometric equations in a given interval.
- A2 – Numerical Methods – Locate roots of  $f(x) = 0$
- Statistics – Probability – Mutually exclusive and independent events
- Statistics – Statistical Distributions – Use Binomial distribution to model real-world situations
- Statistics – Hypothesis Testing – Understand and apply language of hypothesis testing

#### Half Term 5:

- A2 – Integration – Know the Fundamental Theorem of Calculus
- A2 – Vectors – Use vectors in 2D and 3D
- Core Pure 1 AS – Complex Numbers – solve any quadratic equation with real coefficients
- Core Pure 1 AS – Argand Diagrams – Construct and interpret loci in the argand diagram
- Core Pure 1 AS – Matrices – Add, Subtract and multiply matrices
- Core Pure 1 AS – Sums of Series – Know the formula for sums of integers, squares and cubes.
- Core Pure 1 AS – Roots of Polynomials – Link roots of polynomials to coefficients up to quartics
- Core Pure 1 AS – Proof by Inductions – Construct proofs using mathematical induction.
- Core Pure 1 AS – Volumes of Revolution – Derive and calculate volumes of revolution.
- Core Pure 1 AS – Matrix Transformations – Use matrices to represent 2D transformations.
- Core Pure 1 AS – Vectors – Understand and use vector equations of lines and planes in 3D

#### Half Term 6:

- Core Pure 1 AS – Matrix Transformations - Use matrices to represent 2D transformations.
- Core Pure 1 AS – Vectors - Understand and use vector equations of lines and planes in 3D

### Year 13 – Single Maths

#### Half Term 1:

- A2 – Algebraic Methods – Proof by contradiction
- A2 – Functions and Graphs - Understand modulus functions and asymptotes
- A2 – Binomial Expansion - For what range of values is an expansion valid for?
- A2 – Sequences and Series – Increasing, decreasing and periodic sequences
- A2 – Radians – Areas of sectors and lengths of arcs
- A2 – Vectors – Use vectors in 2D and 3D

#### Half Term 2:

- A2 – Parametric Equations – Convert between cartesian and parametric equations
- A2 – Trigonometric Functions – Understand and use Secant, Cosecant and Cotangent
- A2 – Trigonometric Modelling – Solve trigonometric equations in a given interval.
- A2 - Differentiation – Use the 2<sup>nd</sup> derivatives, chain, product and quotient rules.
- A2 – Numerical Methods – Locate roots of  $f(x) = 0$

#### Half Term 3:

- A2 – Integration – Know the Fundamental Theorem of Calculus
- A2 - Statistics – Hypothesis Testing – Hypothesis testing for zero correlation



- A2 – Statistics – Conditional Probability – Find probabilities from Venn Diagrams

Half Term 4:

- A2 – Statistics – Normal Distribution – Using and understanding the Normal Distribution
- A2 - Mechanics – Moments – Understand and use moments in static context
- A2 – Mechanics – Forces and Motion – Find and resolve resultant forces
- A2 – Mechanics – Projectiles – Model motion under gravity in a vertical plane
- A2 – Mechanics – Application of Forces – Resolve forces in static and dynamic context
- A2 – Mechanics – Further Kinematics – Understand and use the formulae for constant acceleration for motion in a straight line.

Half Term 5:

- A2 – Mechanics – Application of Forces – Resolve forces in static and dynamic context
- A2 – Mechanics – Further Kinematics – Understand and use the formulae for constant acceleration for motion in a straight line.
- Exam preparation

**Year 13 – Further Maths**

Half Term 1:

- A2 - Mechanics – Moments – Understand and use moments in static context
- A2 – Mechanics – Forces and Motion – Find and resolve resultant forces
- A2 – Mechanics – Projectiles – Model motion under gravity in a vertical plane
- A2 – Mechanics – Application of Forces – Resolve forces in static and dynamic context
- A2 – Mechanics – Further Kinematics – Understand and use the formulae for constant acceleration for motion in a straight line.
- Module Choices – Further Pure 1, Further Decision 1 or Further Mechanics 1

Half Term 2:

- A2 - Statistics – Hypothesis Testing – Hypothesis testing for zero correlation
- A2 – Statistics – Conditional Probability – Find probabilities from Venn Diagrams
- A2 – Statistics – Normal Distribution – Using and understanding the Normal Distribution
- Module Choices – Further Pure 1, Further Decision 1 or Further Mechanics 1

Half Term 3:

- A2 – Core Pure – Complex Numbers – Know and use the exponential form of a complex number
- A2 – Core Pure – Series – Find the Maclaurin series of a function
- A2 – Core Pure – Methods in Calculus – Evaluate improper integrals
- A2 – Core Pure – Volumes of revolution – Derive and calculate formulae for and calculate volumes of revolution.
- 2<sup>nd</sup> Module Choices – Further Pure 1, Further Decision 1 or Further Mechanics 1

Half Term 4:

- A2 – Core Pure – Polar Coordinates – Convert between Cartesian and polar coordinates
- A2 – Core Pure – Hyperbolic Functions – Understand the functions  $\sinh x$ ,  $\cosh x$  and  $\tanh x$
- A2 – Core Pure – Methods in Differential Equations – Find and use an integrating factor
- A2 – Core Pure – Modelling with Differential Equations – Solve the equation for simple harmonic motion.
- 2<sup>nd</sup> Module Choices – Further Pure 1, Further Decision 1 or Further Mechanics 1

Half Term 5 and 6:

- Complete 2<sup>nd</sup> Module Choices – Further Pure 1, Further Decision 1 or Further Mechanics 1
- Complete A2 Core Pure 2
- Exam preparation
- Exams

**Preparing for the future:**

Mathematics is a facilitating subject for many courses, such as all STEM courses, Medicine, Geography, Computer Science and Economics.

Mathematics is a sought after qualification in many careers, such as Medical, Internet Security, Programmer, Financial planner, Climatologist the list is endless!