

Term Year	Term 1a	Term 1b	Term 2a	Term 2b	Term 3a	Term 3b
7	Algebraic Thinking Sequences Describe and find terms in sequences, look at linear and non-linear sequences, describe term-to-term rules and look at sequences on graphs. Understand and use algebraic notation Work with function machines, finding inputs and outputs in numerical and algebraic form. We will also begin substituting into expressions to generate sequences. Equality and equivalence Solve one step linear equations using bar modelling as well as using inverse operations and we will simplify expressions by collecting like terms.	Place value and Proportion Place value and ordering integers and decimals Use place value to order or compare numbers and place numbers on a number line. We will also round numbers, find the range and median of a set of numbers and begin looking at numbers in standard form. Fraction, decimal and percentage equivalence Representations of fractions, decimals and percentages, convert between them and calculate equivalent fractions.	Applications of Number Solving problems with addition & subtraction Mental and written methods of addition and subtraction, solve problems involving perimeters and money. We will also use tables, frequency trees, bar charts and line charts. Solving problems with multiplication and division Use factors and multiples, convert between metric units and multiply and divide by powers of 10. We will also use written methods of multiplying and dividing to solve problems involving areas of 2D shapes. Fractions & percentages of amounts Find the fraction or percentage of a given amount using written and calculator methods.	Directed Number Operations and equations with directed number Add, subtract, multiply and divide with positive and negative numbers, evaluate algebraic expressions involving directed numbers and begin solving two step equations. We will also look at roots and powers. Fractional Thinking Addition and subtraction of fractions Different representation of fractions, find equivalent fractions and add or subtract fractions, including mixed numbers and improper fractions. We will also begin to look at adding and subtracting algebraic fractions.	Lines and Angles Constructing, measuring and using geometric notation Types of angles, draw and measure angles, construct triangles and polygons using compasses and protractors. We will also draw and interpret pie charts. Developing geometric reasoning Various angle rules, including those that meet on a straight line, angles in triangles and quadrilaterals, and use these rules to solve angle problems. We will also begin looking at angle rules involving parallel lines and polygons.	Reasoning with Number Developing number sense Use mental arithmetic, as well as using factors and estimation in mathematical problems. Sets and probability Use Venn diagrams and sample spaces to calculate probabilities, developing the use of probability vocabulary Prime numbers and proof Find factors, multiples, prime and triangular numbers, then find LCMs and HCFs as well as prime decompositions.
8	Proportional Reasoning Ratio and scale Different representations of ratios, dividing into ratios and solving problems involving ratios. Multiplicative change Direct proportion, conversion graphs, similar shapes and scale drawings. Multiplying and dividing fractions Multiplying and dividing fractions, including mixed numbers and algebraic fractions.	Representations Working in the Cartesian plane Coordinates, recognising and plotting straight line graphs by understanding gradients and y-intercepts. Representing data Scatter graphs, correlations, lines of best fit, frequency tables and the difference between continuous and discrete data. Tables & Probability Sample spaces, two way tables and Venn diagrams.	Algebraic Techniques Brackets, equations and inequalities Expanding and factorising into single brackets, forming and solving equations with brackets and forming and solving inequalities. Sequences Generate sequences using rules and find the nth term of linear sequences. Indices Multiply and divide expressions using laws of indices.	Developing Number Fractions and percentages Convert between fractions, decimals and percentages, use them in calculations and find percentage changes with or without a calculator. Standard index form Convert numbers into standard form, multiply, divide, add and subtract numbers given in standard form and compare numbers in standard form. Number sense Rounding and estimation, find error intervals, convert between metric units and solve problems involving time and money.	Developing Geometry Angles in parallel lines and polygons Work with angle rules between parallel lines, look at the properties of triangles and quadrilaterals and calculate angles in polygons. Area of trapezia and circles Calculate areas and perimeters of triangles, rectangles and circles, calculate areas of parallelograms and trapezia, as well as looking at compound shapes. Line symmetry and reflection Recognise line symmetry and reflect shapes in horizontal, vertical and diagonal lines.	Reasoning with Data The data handling cycle Types of graphs and charts, including pictograms, bar charts, pie charts and line graphs. We will look at grouped data and establish which type of chart is most suitable, as well as considering when graphs and charts can be misleading. Measures of location Use and compare mean, median, mode and range, grouped and ungrouped frequency tables and outliers.
9	Reasoning with Algebra Straight line graphs Gradients and intercepts of straight line graphs, rearrange and plot straight lines given in the form $y=mx+c$ and write the equation of a straight line from a graph. Forming and solving equations Solve one and two step equations and inequalities, including those with the unknown on both sides. We will also be rearranging formulae.	Constructing in 2 and 3 Dimensions Three dimensional shapes Create nets of 3D shapes, draw plans and elevations, calculate surface areas of some prisms and calculate volumes of cubes, cuboids, cones, pyramids and spheres. Constructions and Congruency Constructing loci, drawing perpendicular bisectors, angles bisectors and identifying congruent triangles.	Reasoning with Number Numbers Types of numbers, including integers, real and rational numbers. We will find HCFs and LCMs, calculate with fractions and look at numbers in standard form. Using percentages Convert between fractions, decimals and percentages, calculate percentage changes and reverse percentages with or without a calculator.	Reasoning with Geometry Deduction Angle rules in parallel lines, solve angle problems, including with algebraic terms in various shapes, using geometric reasoning. Rotation and translation Rotational symmetry, rotate shapes, translate points and shapes using vector notation and combine multiple transformations.	Reasoning with Proportion Enlargement and similarity Enlarge shapes by integer, fractional and negative scale factors, as well as looking at similar shapes and right angled triangles. Solving ratio and proportion problems Solve problems involving direct and inverse proportion, look at graphs, calculate with ratios and consider 'best buy' problems.	Representations Probability Calculate relative frequency, expected outcomes and independent events, as well as drawing probability trees and using them to calculate probabilities with and without replacement. Algebraic Representation Draw quadratic and reciprocal graphs, represent inequalities and use graphs to solve simultaneous equations.

	Testing conjectures Look at algebraic statements and consider whether they are always, sometimes or never true. We will also expand single and double brackets.		Maths and money Bills, bank statements, wages and taxes. We will calculate simple and compound interest, as well as looking at exchange rates.	Pythagoras' Theorem Use Pythagoras' Theorem to find missing side lengths in right angled triangles, including looking at proofs of the theorem and looking at using it in 3D shapes.	Rates Speed, distance, time problems and calculations with density.	
10 Lower Strand	Number Data representation Constructing and interpreting two way tables, frequency trees and Venn diagrams. Factors and multiples Prime factor decomposition, LCM and HCF. Solve real-life problems involving HCF and LCM. Proportion Finding the best value and using exchange rates. Rounding and estimation Rounding numbers and estimating calculations. We will then use this to work out error intervals and upper and lower bounds.	Fractions, Decimals and Percentages Percentages Calculate percentage change with and without a calculator, solve problems with interest and depreciation, as well as using reverse percentages to find original amounts. Fractions Working with fractions with all operations, including with mixed and improper fractions. Find the reciprocal of a number. Convert between fractions, decimals and percentages.	Ratio and Proportion Ratio and proportion Simplify ratios, share amounts using ratios, use ratios to solve problems and scale recipes. Indices Indices Use index laws, convert between standard index form and ordinary numbers, and perform calculations with numbers in standard form.	Algebraic Manipulation Expanding and Factorising Expand single and double brackets, and factorise linear and quadratic expressions. Equations and inequalities Solve linear equations, including those that involve brackets and unknowns on both sides of an equation. We will also change the subject of formulae, and solve quadratic equations using factorising. Represent inequalities on a number line, write down integers that satisfy an inequality and solve linear inequalities.	Data Handling Averages and data representation Find mean, median mode and range from a list of data and from frequency tables. We will produce frequency tables, scatter graphs and time series graphs, using the line of best fit on scatter graphs to estimate values and describe relationships. Graphs Coordinate Geometry Plot linear, quadratic and cubic graphs. Identify equations of linear graphs in the form $y=mx+c$. Find equations of lines given two points, or given one point and the gradient.	Graphs Compound Measures We will use formulae for calculating speed, distance and time, as well as density and pressure. We will draw and interpret distance-time and velocity-time graphs. Geometry Pythagoras and trigonometry Use Pythagoras' Theorem and trigonometry to find missing sides and angles in right angled triangles, and use this to solve real-life problems.
10 Higher Strand	Number Recurring Decimals Convert between recurring decimals and fractions. We will also identify whether a fraction becomes a recurring or terminating decimal. Indices Use fractional and negative indices with algebraic and numerical expressions. We will also estimate solutions between two square and cube roots. Product Rule, Accuracy & Bounds Use the product rule for counting, find upper and lower bounds, including for various calculations, and define error intervals. Surds We will simplify, multiply and divide surds, then rationalise denominators that involve surds. Algebra Expanding and Factorising Expand and factorise double brackets, including quadratics with a not equal to 1. We will also expand the product of three brackets. Rearranging Rearrange equations and formulae, including where the variable appears twice and where the variable is in the denominator. Sequences Find missing terms in linear, quadratic, geometric and Fibonacci-type sequences, use the nth term to find any term in a sequence, and find the nth terms of linear and quadratic sequences.		Geometry Transformations Perform and describe translations, reflections, rotations and enlargements, as well as combinations of these transformations. Further Algebra Quadratics and Iteration Solve quadratics using factorising, completing the square, the quadratic formula and by iteration. We will interpret solutions and prove that a solution lies between two values. We will also solve cubic equations using iteration. Simultaneous Equations Solve linear simultaneous equations using elimination and substitution. We will also use substitution to find solutions where one equation is quadratic or circular. We will also look at solution sets for a pair of linear inequalities. Probability Probability Calculate probabilities from two-way tables, Venn diagrams, probability trees, considering when events are independent or mutually exclusive. We will also calculate relative frequency from experimental data and compare this with theoretical probability.		Further Geometry Similarity in 2D and 3D Look at the properties of similar shapes in both 2D and 3D. We will use and find scale factors, considering how they affect lengths, areas and volumes or similar shapes. Graphs of Trigonometric Functions Recognise and sketch sine, cosine and tangent graphs and apply transformations. Further Trigonometry Use the sine and cosine rules to calculate lengths, angles and areas in any triangle. We will also use trigonometric relationships and Pythagoras' Theorem in 3D shapes. Data Handling Sampling Compare relative frequencies from samples of different sizes. Cumulative Frequency and Boxplots Construct and use cumulative frequency tables and graphs, interpret them, use them to estimate frequencies and use them to estimate the median and interquartile range. We will also draw and interpret boxplots. Histograms Look at when to use histograms, construct them using equal or unequal class widths, and use them to estimate the mean and median of a set of data.	

	Geometry Coordinate Geometry Plot straight lines given in the form $y=mx+c$ or $ax+by=c$ by rearranging to find the gradient and y-intercept. Find the equation of a straight line when given two points or one point and the gradient. We will also find parallel and perpendicular lines, recognise reciprocal, cubic and quadratic graphs, as well as learning the equation of a circle. Surface Area and Volume We will convert between metric units, calculate surface area and volume for cubes, cuboids, cones, pyramids, spheres, hemispheres and cylinders, as well as compound solids.	Proportion Direct and Inverse Proportion We will set up and solve direct and inverse proportion equations and compare graphs of each type. We will also look at equations involving powers and roots of x.	
11	Graphs Graphs of circles, cubes and quadratics Sketch graphs of quadratic functions, identify roots, y-intercept and turning point by completing the square, identify if a quadratic equation has any real roots, find approximate solutions to quadratic equations, solve simultaneous equations graphically, find graphically the intersection points of a straight line with a circle, solve quadratic inequalities, represent the solution set for inequalities using set notation, and show the solution set of several inequalities in two variables on a graph. Gradient and area under graphs Sketch graphs of reciprocal and exponential functions, solve exponential growth and decay problems, estimate area under a graph, interpret the gradient of linear or non-linear graphs, estimate the gradient of a non-linear graph at a given point, use a velocity–time graph to estimate the acceleration at a specific time, and interpret the gradient of a graph in financial contexts. Circles Circle geometry Investigate loci to draw circles and perpendicular lines, find the equation of a tangent to a circle at a given point, and construct the graph of a circle centred at the origin. Circle theorems Identify parts of a circle, prove and use circle theorems. Apply circle theorems to more complex geometric problems. Further Algebra Algebraic fractions Simplify algebraic fractions, add, subtract, multiply and divide algebraic fractions, and solve equations involving algebraic fractions.	Further Algebra Functions Write a ratio as a linear function, use function notation, find the inverse of a function, find the composite of two functions, and analyse transformations of graphs of functions. Algebraic Proof Learn to represent different types of integers algebraically, and use these representation to construct algebraic proofs. Geometric Proof Congruence and geometric proof Prove results such as the angle sum of a triangle, use formal geometric proof for the similarity of two given triangles, prove the congruence of triangles and other shapes using formal arguments, and solve angle problems by first proving congruence. Vectors Understand and use vector notation, represent vectors, combinations of vectors and scalar multiples pictorially, perform vector calculations using column vectors, find the magnitude of a vector, calculate the resultant of two vectors, solve geometric problems, and construct geometric proofs using vectors. Revision	Revision and Exams

12 Applied Teacher	Statistical Sampling Chapter 1 - Data Collection Consider the advantages and disadvantages of different forms of sampling. We shall also consider different types of real-world statistical data. Data Representation and Interpretation Chapter 2 - Measures of location and spread Build upon GCSE work on analysing data. Calculate measures of central tendency, such as the mean, median and mode, and other measures of location, such as quartiles and deciles. Students will extend their knowledge of measures of spread to include inter-percentile range, variance and standard deviation. Chapter 3 - Representations of data Extend knowledge gained at GCSE about boxplots, cumulative frequency graphs and histograms. Use knowledge gained in this unit to analyse and compare two data sets and make conclusions based on inferences. Chapter 4 - Correlation Consider the correlation of bivariate data and explore the use of linear regression models. Quantities and units in Mechanics Chapter 8 - Modelling in mechanics Learn about assumptions used in Mathematical modelling. Apply knowledge of vectors from GCSE to real-life scenarios. Kinematics 1 Chapter 9 - Constant acceleration Build upon GCSE knowledge of speed, distance and time to interpret velocity and displacement-time graphs and solve problems relating to both. Also learn how to derive formulae based on constant acceleration and apply these in different contexts including both horizontal and vertical motion. Also solve multi-stage problems, including those where objects are falling freely due to gravity.	Probability Chapter 5 - Probability Consider different methods for calculating probability, such as sample space, Venn and tree diagrams. Also determine whether two events are independent or mutually exclusive. Statistical Distributions Chapter 6 - Statistical distributions Introduce discrete probability distributions and become familiar with different representations for them. Also learn how to calculate probabilities of single values from a binomial distribution using a calculator. We will then extend our understanding of binomial distributions and learn to calculate cumulative probabilities. Statistical Hypothesis Testing Chapter 7 - Hypothesis testing Learn to formulate a hypothesis about an event occurring within a population, using technical language, based upon assumptions made about that population. We will then use our knowledge of binomial distribution to test our hypotheses against a sample of the population by considering multiple methods such as finding critical regions and calculating the probability of a test statistic. We will then use these findings to draw conclusions in real-world contexts. Vectors Pure Chapter 11 – Vectors Build upon work studied at GCSE on vectors. Calculate the magnitude and direction of a vector and use this to solve problems. Use vectors to solve geometric problems, producing universal results and apply these results to real-world contexts. Forces and Newton’s Laws Chapter 10 - Forces and motion Draw complete force diagrams to consider all forces acting on an object. Use knowledge of vectors to apply them in the context of forces and use Newton’s three laws of motions to calculate an object’s acceleration and solve problems using these results.	Forces and Newton’s Laws Chapter 10 - Forces and motion Apply knowledge of Newton’s three laws to solve problems with connected particles, such as pulleys. Kinematics 2 Chapter 11 - Variable acceleration Draw upon knowledge from various topics of the year 1 pure mathematics course and apply them to real-world contexts. We will use differentiation and integration to solve kinematic problems and we will derive constant acceleration formulae. Slack for revision and end of year exams Conditional Probability Chapter 2 (A2) Conditional probability Extend on work studied in AS probability. Use set notation and explore conditional probability using multiple representations, including Venn diagrams and two way tables. Also use probability formulae and solve problems using conditional probability. Forces at any angle Chapter 5 (A2) - Forces and friction Consider the role friction has in kinematic systems and be able to understand and calculate the magnitude of friction in each situation. Work with forces on inclined planes and explore how the change of the angle of incline of the slope affects the forces acting on an object. We will use knowledge gained in year 1 to solve more complex problems involving constant acceleration. Moments Chapter 4 (A2) - Moments Calculate the turning effect of a force applied to a rigid body, consider all turning forces acting on a body to calculate the overall force and examine what this means in a real-world context. Students will calculate moments on rods, both uniform and non-uniform, and solve problems with objects at the point of tilting.
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12 Pure Teacher	GCSE Algebra Recap Chapter 1 – Algebraic Expressions Recap and build upon techniques learnt from GCSE on ways to manipulate algebraic expressions. This includes expanding and factorising quadratics, index laws and surds. Chapter 2 – Quadratics Recap solving quadratic equations from GSCE. We will use this knowledge to learn about sketching a quadratic function and the importance of the discriminant. Chapter 3 – Equations and Inequalities Recap knowledge from GCSE on solving both linear and quadratic equations and inequalities, as well as simultaneous equations. Graphs and Coordinate Geometry Chapter 4 – Graphs and Transformation Expand upon knowledge of graphs from GSCE, exploring the graphs of polynomials of different degrees. Afterwards, we will look at the result of graphs after a transformation, now including stretching parallel to each axis. Chapter 5 – Straight Line Graphs Formalise different ideas explored in GCSE on equations of straight lines. We will then delve deeper into coordinate geometry and the use of linear functions in modelling problems. Chapter 6 – Circles Further develop our knowledge of circles, now including when the centre is not the origin. This is then combined with knowledge from previous chapters to solve coordinate geometry problems.	AS Further Algebra Chapter 7 – Algebraic Methods Practice new methods of manipulating algebraic expressions, including using the factor theorem with cubic expressions. We will use these methods to help construct mathematical proofs. Chapter 8 – Binomial Expansion Explore the different components of the Binominal Expansion, such as Pascal's triangle and factorial notation. We will use this knowledge to make approximations of complicated functions. AS Trigonometry Chapter 9 – Trigonometric ratios Recap the trigonometric formulas used in GCSE and how we can apply them when problem solving. We will then explore the different trigonometric functions, sketching their graphs and applying transformations. Chapter 10 –Trigonometric Identities and Equations Develop our understanding of different trigonometric relationships, before moving onto using these to solve various trigonometric equations, including quadratics. AS Calculus Chapter 12 – Differentiation Introduce the topic of calculus, focusing specifically on differentiating polynomials and other powers of x. We will explore the uses of different order derivatives and their use in real life modelling, particularly in the process of 'optimisation'.	AS Calculus Chapter 13 – Integration In this chapter, we will explore the partial inverse of differentiation; integration. We will learn how to integrate polynomials and other powers of x. We will also look at how to use integration to calculate areas bounded by curves. Exponentials and Logarithms Chapter 14 – Exponentials and Logarithms Explore the meaning and use of exponents and logarithms. We will interpret models that use exponential functions, learn and apply the laws of logarithms, and solve equations in the form $ax=b$. Slack for revision and end of year exams A2 Further Algebra Chapter 1 (A2) – Algebraic methods Recap arithmetic involving algebraic fractions and look at splitting algebraic fractions into partial fractions. We also look at a new method of proving that statements are true; proof by contradiction Chapter 2 (A2) – Functions Build upon prior knowledge of function notation, and inverse and composite functions from GCSE. We extend this to modulus functions and explore the graphs of these functions.
13 Applied Teacher	The Normal Distribution Chapter 3 - The normal distribution Learn the characteristics of the normal distribution curve and use it to calculate values and probabilities using a calculator. Building upon work done in Year 12, find means and standard deviations for normally distributed, continuous random variables and also use this distribution as an approximation to the binomial distribution. Finally, we shall apply everything learned last year regarding hypothesis testing to continuous random variables and the normal distribution. Regression and Correlation Chapter 1 - Regression, correlation and hypothesis testing Bivariate (paired) data can show a strong relationship that is not linear. We shall use logarithms to examine trends in non-linear data. We shall also consider correlation in bivariate data and carry out hypothesis tests for possible correlation. Applications of Kinematics Chapter 6 - Projectiles Analyse the motion of a projectile by considering its horizontal and vertical motion separately. Learn that the horizontal motion can be modelled as having constant velocity, but that they will have to include acceleration due to gravity in the vertical motion. Both of these will draw heavily upon the 'SUVAT' work done in Year 12. We will also derive the equation of the path of a projectile and formulae for time of flight, range and greatest height.	Applications of Forces Chapter 7 - Application of forces (Dynamics) As more force is applied to an object, forces become unbalanced and we reach a dynamic situation where the object starts moving. We will learn that, in this situation, we not only need to consider unknown forces involving pulleys, strings, rough surfaces and inclined planes, but also Newton's laws of motion. Further Kinematics Chapter 8 - Further kinematics Combine previous work on vectors with that on motion to produce vector equations for displacement, velocity and acceleration. We will also use calculus from Pure studies and learn to differentiate and integrate equations of motion with respect to time. This will enable us to now consider variable acceleration in addition to the constant acceleration of 'SUVAT'. Vectors 2 Pure Chapter 12 - Vectors (3D) This topic extends the work on vectors in two dimensions that was done at GCSE and in Year 12. We will begin by understanding Cartesian coordinates in three dimensions (x, y, z). We will then learn to use vectors to describe positions in relation to the three dimensions before using these vectors to solve geometric and mechanical problems. Numerical Methods Pure Chapter 10 - Numerical methods We shall consider different methods for finding or approximating the roots of functions. We will learn how to use change of sign, iteration and the Newton-Raphson procedure to achieve this.	Revision and Exams

	Applications of Forces Chapter 7 – Application of forces (Statics) When the forces acting upon a body are balanced, it is static or in equilibrium. We will use this to find unknown forces involving pulleys, strings, rough surfaces and inclined planes.		
13 Pure Applied	Sequences and Series Chapter 3 - Sequences and Series Build upon GCSE knowledge of linear and geometric sequences, and learn to calculate the sum of a series. We will then progress onto application of arithmetic and geometric series to real-life problems. A2 Trigonometry Chapter 5 - Radians Introduce a new measure for angles and explore how it affects calculations involving circles. This is an important bridging topic in preparation for A2 calculus. Chapter 6 - Trigonometric Functions Here we explore reciprocal and inverse trigonometric functions and form new identities involving these functions. We then use these to solve a wider range of trigonometric equations. Chapter 7 - Trigonometry and Modelling Introduce compound angle formulae and harmonic form and use these to model real-life situations. These will also be used in A2 Mechanics.	A2 Further Algebra Chapter 4 - Binomial Expansion Build upon binomial expansion from AS. Explore non-integer and negative indices and link it to series and partial fractions. Chapter 8 - Parametric Equations Explore a new class of equations where we express 2 variables in terms of a third variable called a ‘parameter’. A2 Calculus Chapter 9 - Differentiation Explore differentiating a wider range of functions (trigonometric, logarithms, exponentials etc.) as well as products, quotients and composites of these functions. Also look at differentiating functions written as parametric equations. We also begin to explore rates of changes and how we can form differential equations. Chapter 11 - Integration Explore integrating a wider range of functions (trigonometric, logarithms, exponentials etc.). Look at different integration techniques such as integration by parts and integration by substitution. We also apply these different techniques to solving first order differential equations.	Revision and Exams

Key:

Shape

Number

Probability

Data

Ratio & Proportion

Algebra