7	**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**	**Unit 5**
	Numbers and Numerals Students experience a range of number and numeral systems to develop their understanding of the base 10 place value system.	**Factors and Multiples** Students are given the opportunity to explore the 'structure' of the natural numbers.	**Axioms and Arrays** Students develop their understanding of different models for multiplication and division. They also explore the axioms of number and which operations they are applied to.	**Multiplication and division** This unit builds upon the unit on axiom and arrays. Students will be given time to conceptually understand multiplication and division. Students will consider the most effective methods and link this to their understanding of axioms and arrays to their calculations	**Addition and subtraction** Once again, this unit builds upon the unit on axiom and arrays. Students will be given time to conceptually understand addition and subtraction.
	Unit 6	**Unit 7**	**Unit 8**	**Unit 9**	**Unit 10**

	Order of Operations Students will develop an explicit understanding of the order of operations based on the equal priority of addition with subtraction and multiplication with division.	**Positive and Negative Numbers** This unit provides opportunities to interpret negative quantities in practical situations.	**Angles** This unit covers estimating, measuring, drawing and calculating angles.	**Classifying 2-D shapes** This unit involves analysing the geometric properties of polygons before focusing more closely on triangles and quadrilaterals.	**Expressions, equations and inequalities** Students extend their understanding of number and apply it to algebraic notation.

	Unit 11	**Unit 12**	**Unit 13**	**Unit 14**	**Unit 15**
7	**Coordinates** In this unit, students develop their understanding of the Cartesian coordinate grid and solve problems in all four quadrants.	**Area and perimeter of 2-D shapes** In this unit, the concept of area as a measurable quantity is introduced. Students also engage with generalised statements about the relationship between area and perimeter.	**Prime factor decomposition** In this unit, students revisit the composition of numbers. The uniqueness of the prime number decomposition, for which indices notation is used, is explored.	**Conceptualising and comparing fractions** Students explore multiple interpretations of fractions and establish useful language and representations to use alongside these. These are built to consider the concepts of equivalent fractions, improper and mixed fractions.	**Manipulating and calculating with fractions** In this unit students extend their understanding of applying the four operations to non-integer values. This includes non-integers represented as fractions, decimal fractions and mixed numbers.

	Unit 16	Unit 17	Unit 18	Unit 19	Unit 20
	Decimals Having explored fractions and how it is linked to decimals, the concepts now comes full circle and students have another opportunity to build on their work on place value, addition and subtraction. We also explore how place value affects decimal calculation.	**Ratio** This unit explores ratio notation, language, representations and contexts.	**Percentage** Students work with percentages as another representation of ratios and fractions. The unit progresses to the use of percentages to compare quantities and find a given percentage of a quantity.	**Transforming 2-D figures** In this unit, students consider how different transformations (reflection, rotation, translation and enlargement) act on an object produce different images.	**Constructing triangles and quadrilaterals** This unit involves students drawing and constructing triangles and quadrilaterals.

8	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5

	Sequences In this unit, sequences are derived from the same geometric patterns and other contexts. Different types of sequences are explored including linear, non-linear, arithmetic and geometric. Fibonacci sequences are also introduced as well as special sequences of numbers such as triangular and square numbers.	**Forming and solving equations** In this unit students formalise methods for solving equations. Students use inverse operations to transform equations with one and two steps and encounter equations involving a single bracket.	**Forming and solving inequalities** In this unit students develop their understanding of solving equations to solving an inequality with one unknown.	**Linear graphs** This unit formally introduces students to straight line graphs. They will develop strategies for identifying and drawing graphs of linear functions.	**Accuracy and estimation** This unit provides an opportunity for students to consolidate their understanding of rounding to a given decimal place. Significant figures are introduced through measuring contexts. Estimation is encountered and is an opportunity to practice rounding and unit conversions.
	Unit 6	**Unit 7**	**Unit 8**	**Unit 9**	**Unit 10**
	Ratio, real life graphs and rates of change In this unit students build on proportional reasoning and experience the different ways of defining ratio and proportion. A variety of contexts are used to explore and clarify concepts.	**Direct and inverse proportion** This unit begins by looking at proportional relationships in familiar contexts and on building on understanding of ratio. Students look at the meaning of direct proportion and make links to linear graphs. Students will also be introduced to the concept of inverse proportion.	**Univariate data** Students explore a variety of methods of presenting data, with an emphasis on interpretation. They are presented a series of inquiry questions and are asked to make hypotheses. They will begin to consider different ways of representing a data set as well as calculate averages and range from grouped	**Bivariate data** Students extend their understanding of statistical diagrams and measures to bivariate data. They will investigate ways of displaying a relationship between two dependent variables, examine relationships, and make simple inferences about association and	**Angles in polygons** Students revisit angle facts including angles in parallel and perpendicular lines. They use their understanding of angles in triangles to prove the sum of the interior angles in polygons. Students examine the relationship with between the exterior and interior angles.

			and ungrouped data.	covariation.	

8	**Unit 11**	**Unit 12**	**Unit 13**		
	Bearings The introduction of bearings is another chance to apply and practice concepts involving angles that have been taught in year 7.	**Circles** In this unit, students explore the connection between the circumference of a circle and its diameter and, through this, are introduced to pi as a constant.	**Volume and surface area of prisms** In this unit, students formally meet volume as a measure of the space inside a 3-D object. They also relate their learning of area to nets.		

9	**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**	**Unit 5**
	Fractions, decimals and percentages review Students review key knowledge from year 7 and 8.	**Probability** Students will explore the language of probability. They will look at the relationship between relative frequency and theoretical probability, and understand that different trials of an experiment may produce different outcomes.	**Sets, Venn and sample space diagrams** In this unit, students will look at a variety of ways of representing outcomes, including using Venn and tree diagrams. Two-way tables and the vocabulary associated with it are also introduced.	**Solving algebraically** After recapping algebra taught in years 7 and 8, students will explore different methods of solving simultaneous equations. This includes setting up and solving using algebraic methods.	**Solving graphically** This unit involves finding the solutions graphically to a set of one or more simultaneous equations. Students will focus on linear simultaneous equations
	Unit 6	**Unit 7**	**Unit 8**	**Unit 9**	**Unit 10**

	Angles in polygons Students revisit angle facts, including angles in parallel and perpendicular lines. They use their understanding of angles in triangles to build up to a proof for the sum of the interior angles in polygons and examine the relationship with between the exterior and interior angles.	**Bearings** The introduction of bearings is another chance to apply and practice concepts involving angles that have been taught in year 7.	**Constructions, congruence and loci** Students are given the opportunity to use a ruler and compass to construct perpendicular to lines and angle bisectors. They will explore sets of points (loci) that satisfy conditions. Students will determine if two shapes are congruent, focussing on congruent triangles.	**Pythagoras' Theorem** Students will use both algebraic and geometric approaches to prove Pythagoras' theorem. They will use the theorem in a variety of contexts to solve problems and find the lengths of missing sides.	**Ratio review** Students review key knowledge from year 7 and 8.

9	**Unit 11**	**Unit 12**	**Unit 13**	**Unit 14**	**Unit 15**

	Similarity and enlargement After reviewing ratio from year 7 and 8, students will learn to enlarge shapes from a given centre and explore the properties that have remained the same. Area and volume of similar shapes will also be explored	**Surds & trigonometry** In this unit, students will be introduced to surds. Students will deepen their understanding of similarity by considering the trigonometric ratios in right-angled triangles.	**Quadratic expressions** In this unit, students will consolidate their knowledge of area and perimeter by using these as a vehicle for expanding and factorising binomial expressions.	**Quadratic equations** Students will extend their understanding of plotting graphs, applying it to quadratic functions. Alongside solving graphically, they will be able to solve quadratic equations algebraically.	**Indices and standard form** In this unit, students will learn about index notation and the Laws of Indices, including fractional and negative indices. They will explore expressing very large and small numbers in standard form and be able to convert between standard form and ordinary numbers.
	Unit 16				
	Growth and decay Students will learn about compound percentage change and reverse percentage change. They will then explore other growth and decay contexts.				

KS4 Foundation course	**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**	**Unit 5**
	Number Students will learn about: ▪ Factors, multiples and primes ▪ Powers, roots and indices ▪ Standard form ▪ Sequences	**Applications of algebra** Students will learn about: ▪ Algebra review ▪ Quadratics ▪ Quadratic graphs ▪ Simultaneous equations	**Percentages and probability** Students will learn about: ▪ Fractions, decimals and percentages ▪ Percentages ▪ Probability, sets, Venn and Sample Space diagrams	**Geometry** Students will learn about: ▪ Transformations ▪ 2D shapes and circle geometry ▪ 3D shapes ▪ Volume and surface area	**Similarity** Students will learn about: ▪ Ratio ▪ Compound measures ▪ Direct and inverse proportion ▪ Pythagoras' Theorem ▪ Similarity and trigonometry
	Unit 6	**Unit 7**	**Unit 8**		
	Data Handling Students will learn about: ▪ Averages and range ▪ Data collection and sampling ▪ Presenting data	**Reasoning and proof** Students will learn about: ▪ Vectors ▪ Geometric reasoning ▪ Bearings ▪ Congruence ▪ Construction and Loci	**Graphs** Students will learn about: ▪ Linear inequalities ▪ Linear graphs ▪ Non-linear graphs		

KS4 Higher course	**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**	**Unit 5**
	Number Students will learn about: ▪ Powers, roots and indices ▪ Surds and irrational numbers ▪ Standard form ▪ Sequences	**Applications of algebra** Students will learn about: ▪ Quadratics ▪ Quadratic graphs ▪ Algebraic fractions ▪ Simultaneous equations	**Percentages and probability** Students will learn about: ▪ Fractions, decimals and percentages ▪ Percentages ▪ Probability, sets, Venn and Sample Space diagrams ▪ Conditional probability	**Geometry** Students will learn about: ▪ Transformations ▪ Bounds ▪ 2D shapes and circle geometry ▪ 3D shapes ▪ Volume and surface area	**Similarity** Students will learn about: ▪ Compound measures ▪ Direct and inverse proportion ▪ Pythagoras' Theorem ▪ Similarity and trigonometry ▪ 3D triangles
	Unit 6	**Unit 7**	**Unit 8**	**Unit 9**	

	Data Handling Students will learn about: ▪ Averages and range ▪ Data collection and sampling ▪ Presenting data ▪ Further statistical diagrams	**Reasoning and proof** Students will learn about: ▪ Vectors ▪ Geometric reasoning ▪ Circle theorems ▪ Bearings ▪ Congruence ▪ Construction and Loci	**Inequalities and graphs** Students will learn about: ▪ Inequalities ▪ Linear graphs ▪ Non-linear graphs ▪ Trig graphs	**Inequalities and graphs** Students will learn about: ▪ Algebraic proof and reasoning ▪ Recurrence relations ▪ Functions ▪ Transformation of graphs ▪ Further graphs	

12	**Pure – Proof**	**Pure – Algebra and Functions**	**Pure – Coordinate Geometry in the x-y plane**	**Pure – Sequences and Series**	**Pure – Trigonometry**
	Algebraic Proof Proof by counter example Proof by exhaustion Proof by deduction	Indices Surds Simultaneous Equations Quadratic Functions Inequalities Polynomials Curve Sketching Functions Graph Transformations	Straight Lines Circles	Binomial Expansion	Sine and Cosine Rules Trig Graphs Exact Trig Values Trig Identities Trig Equations
	Pure – Exponentials and Logs	**Pure – Differentiation**	**Pure – Integration**	**Pure – Vectors**	**Statistics – Sampling and Data Representation**

	Properties of both Gradient of e^x Laws of Logs Solving equations Reduction to linear Modelling	Gradients First Principles Standard Functions Tangents and Normals Stationary Points Increasing/ Decreasing Functions	Fundamental theorem of Calculus Indefinite Integrals Definite Integrals	Vector form Magnitude and direction Basic Operations Position Vectors Distance between points Problem Solving	Sampling Single Variable Data Bivariate Data Measures of average and spread Mean and Standard Deviation Outliers and Data Cleaning

	Statistics – Probability	**Statistics – Distributions**	**Statistics – Hypothesis Testing**	**Mechanics – Kinematics**	**Mechanics – Forces and Newton's Laws**
12	Mutually exclusive events Independent events Probability Modelling	Discrete Distributions Binomial Distribution	Language Testing for proportion	SI Units Language Graphical Representation Constant Acceleration Non-Uniform Acceleration Gravity	Newton's 1st Law Newton's 2nd Law Weight Newton's 3rd Law Friction

	YEAR 2: **Pure – Algebra and Functions**				
	Polynomials Curve Sketching Functions Graph Transformations Partial Fractions Modelling				

	Pure – **Proof**	**Pure –** **Algebra and Functions**	**Pure –** **Coordinate Geometry in the x-y plane**	**Pure –** **Sequences and Series**	**Pure –** **Trigonometry**
13	Proof by Contradiction	Polynomials Modulus Function Curve Sketching Graph Transformations Modelling	Parametric Equations	General Binomial Expansion Sequences Sigma Notation Arithmetic Sequences Geometric Sequences Modelling	Radians Small Angle Approximations Exact Values Reciprocal Functions Trig Identities Solving Equations Proof Functions in Context

	Pure – Differentiation	**Pure – Integration**	**Pure – Numerical Methods**	**Pure – Vectors**	**Statistics – Probability**
	Using 2nd Derivatives First Principles for Trig Differentiation of Trig Points of Inflection Product and Quotient Rule Chain Rule Parametric and Implicit Constructing Differential Equations	Integration of functions Area between two curves Integration by substitution Integration by parts Partial Fractions Separation of Variables Solutions of Differential Equations	Sign Change Method Formal Iterative Methods Numerical Integration Numerical Methods	Vectors in 3D Solving problems in Kinematics	Conditional Probability Critiquing Assumptions

13	**Statistics – Distributions**	**Statistics – Hypothesis Testing**	**Mechanics – Kinematics**	**Mechanics – Forces and Newton's Laws**	**Mechanics – Moments**

	Discrete distributions Normal Distributions Selecting Appropriate distribution	Testing for the mean from Normal Distribution Testing using Pearson's correlation coefficient	Constant Acceleration in 2D Non-Uniform Acceleration Gravity	N2L N3L Vectors in a Plane Frictional Forces	Statics

Aspirations for our students

Mathematics is the science that deals with the logic of shape, quantity and patterns; the study of Mathematics provides a powerful and universal intellectual toolkit for the abstract study of these concepts so as to better understand the world around us.

At Pimlico, our aims for the Mathematics curriculum can be divided into two strands:

- To develop pupils' mathematical knowledge
- To develop pupils' appreciation and interest in the subject

Mathematical knowledge

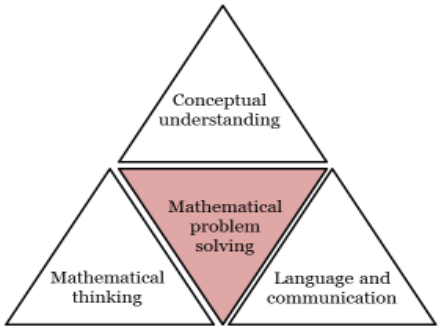
It is universally accepted the Mathematics is a fundamental skill for everyday life and that it plays a pivotal role in future success. Consequently, it is a statutory subject to the age of 16. Our role as maths teachers is to ensure that our students are equipped not just with the skills they require to succeed in the subject academically but also the ability to apply what they have learned to other subjects, contexts and more long term, the world of work. We want our students to be familiar and fluent with the mathematical techniques they are taught.

Appreciation for the subject

The study of mathematics stretches our minds to think logically and critically. It has its own vocabulary and patterns of thinking and encourages students to develop their curiosity. Being keen mathematicians, our department endeavours to share our love for mathematics with our students; to appreciate its beauty and importance, and recognise it as a creative venture underpinned by the process of problem solving.

We recognise that we live in a fast-evolving world; the kinds of higher-order problems we expect pupils to be able to solve are no longer just vital to the scientific, engineering and manufacturing industries. With rapid technological advances come new and unique challenges – to be successful, our students need to be taught to be adaptable, fast-thinking and solution focussed. Mathematics provides the enabling knowledge necessary to develop these skills.

Our Process



Conceptual understanding

To accomplish this, we must first acknowledge that an automatic fluency in the fundamental mathematical facts and operations is prerequisite to achieving higher-order problem solving skills; thus, our curriculum is rooted in the principles of mastery to ensure that we teach for depth and fluency of concepts, rather than breadth. By introducing topics through concrete examples, followed by pictorial representations before finally progressing to abstract concepts, we ensure our students have a strong foundation that allows them to later reinforce their knowledge in different contexts.

Mathematical thinking

As pupils' understanding of the basic operations and concepts strengthens, they will be able to begin to study increasingly complex related mathematical concepts. They will also be encouraged to make links between the different strands of mathematics (Number, Algebra, Geometry, Probability, Statistics and Ratio).

Language and communication

Within our lessons, we have high expectations of students. Students are exposed to Tier 3 vocabulary from Year 7 and are expected to use this in their discussions, explanations and written work. Additionally, the nature of Mathematics means it is accompanied by its own language and conventions, which pupils are also expected to be fluent in.

Effective communication of problem solving requires precision in visual, verbal and written presentation. We attach great importance to presenting findings in a logical and rigorous fashion, one that economises information for the benefit of clarity and purpose. It is our hope that pupils develop a mature and systematic approach to identifying and selecting the appropriate methods to solve problems effectively and efficiently.

Aim

Key Stage 3:

The first term of year 7 focusses on developing understanding of the axioms and structures of number that are fundamental to mathematics. This underpins understanding of the algebraic notation developed in this term and in subsequent years. The spring term of year 7 focusses on geometry, an important area of mathematics for students to engage with. The cumulative nature of the curriculum means that students apply algebraic reasoning in new contexts. Students' understanding of fractions, decimals, and percentages from KS2 is built upon throughout the year. This is developed more formally in the summer term where time is spent linking different interpretations of fractions and introducing ratio.

Year 8 continues to apply focus to developing number and geometry skills, with students building on the knowledge accumulated in year 7. Students begin to learn calculator skills, using with more complex geometry calculations such as area of a circle. Algebra skills are revisited with a new focus on factorising as well as plotting and interpreting graphs for the first time. Students will begin to see the link between proportion and graphs as their knowledge of ratio and proportion expands.

The focus in year 9 shifts away from number with more of an in-depth focus on algebra and geometry. Students will continue to study proportion and multiplicative reasoning, exploring real world application problems such as calculating interest rates and working with similar shapes. This year, students will study statistics and probability for the first time. As algebra skills become more advance, students will be introduced to solving simultaneous equations and quadratic equations.

Key Stage 4:

During year 10 and 11 the curriculum splits into two tiers – higher and foundation, at which point, students begin to follow different programmes of study. Students will begin by revisiting key threshold concepts such as basic number and algebra skills for foundation, and more advanced number skills for higher. One of the aims of the maths curriculum is for students to become more confident with, and fluent in problem solving. This takes centre stage during the two-year GCSE course.