Fairfield High School for Girls

Mathematics – Year 8

Long-Term Plan 2025-2026

Calendar	Topic	Assessment	Sequencing and Coherence *concepts - themes - skills*	Literacy *reading - vocabulary - oracy - writing*
Autumn - Half Term 1	**Index Laws** • Understand index notation • Use index laws for multiplying and dividing powers and for simplifying powers when raised to an exponent • To study powers that have an exponent which is 0 or negative • Change the base of a power without evaluating it. **Algebraic Expressions** • Use the distributivity of multiplication over addition to multiply a monomial by a polynomial (expand a single bracket) • Factorise expressions where there is one common factor. • Multiply a binomial by a binomial (expand and simplify double brackets)	A 30 minute in-class, non-calculator Key Topic Test *(mini-summative assessments with formative follow-up)* based on: • Index Laws • Algebraic Expressions • Fraction Arithmetic *Note: Throughout the year, pupils complete short, focused assessments called Key Topic Tests. These help classroom teachers quickly identify any gaps in understanding so they can address them before moving on to new content. The tests also help us monitor how pupils are progressing over time, allowing subject leaders to provide*	This unit on Index Laws introduces pupils to index notation as a compact way to represent repeated multiplication, building on their prior understanding of powers of 10 and algebraic expressions. Pupils learn and apply the laws of indices for multiplication, division, and powers raised to powers, developing fluency in simplifying expressions and preparing for more complex algebraic manipulation. The unit then extends to zero and negative indices, encouraging pupils to reason about patterns and inverse operations. Pupils also learn to change the base of a power without evaluating it, promoting flexibility in algebraic thinking and laying the foundation for exponential equations and standard form in future topics. This Algebra unit builds on pupils' prior experience with algebraic notation and simplification from Year 7. Pupils begin by expanding single brackets using the distributive law and factorising expressions with a common factor, reinforcing their understanding of structure and equivalence. They then progress to multiplying two binomials, developing fluency in expanding and simplifying double brackets. Pupils also practise forming expressions from real-life contexts and substituting values into expressions involving brackets and indices. Extension work	**Key Vocabulary:** index, base, exponent, power, simplify, expand, factorise, expression, term, coefficient, bracket, numerator, denominator, improper, mixed number **Oracy:** Pupils explain the meaning of index laws and justify simplification steps using structured sentence stems (e.g. "I used the power of a power rule because…"). **Reading:** Interpreting algebraic expressions from worded contexts; reading fraction problems involving mixed operations.

	• Form algebraic expressions from contexts • Substitute, positive and negative integers, into expressions involving brackets and indices **Fractions** • Addition/Subtraction of Mixed Number Fractions • Multiplication and Division of Mixed Number Fractions	*additional support or interventions where needed.*	includes multiplying more than two polynomials and exploring the structure of the difference of two squares, laying the groundwork for future work on quadratic identities and factorisation in Year 9 and beyond. Pupils consolidate their understanding of fraction arithmetic, with opportunities to consider algebraic fractions, fractions calculations with more than one operation and Egyptian fractions, where fractions are expressed as the sum of a unit fraction.	
Autumn - Half Term 2	**Solving Equations** • Solve linear equations • Solve univariate equations involving powers that can be solved by balancing/inverse operations • Form and solve equations from a context. **Rounding and Estimating** • Round numbers to powers of 10, a given number of decimal places and significant figures • To use rounding to estimate difficult calculations	A 30 minute in-class, calculator Key Topic Test based on: • Solving Equations • Rounding and Estimating • Circles	This Equations unit builds on pupils' prior experience with solving one and two-step linear equations from Year 7. Pupils begin by consolidating their use of inverse operations and balancing methods, then progress to solving equations with unknowns on both sides, developing fluency in rearranging and simplifying expressions. They also tackle more complex univariate equations, such as those involving squared terms (eg. $3y^2 + 1 = 49$, and apply their skills to form and solve equations from real-life contexts. This prepares them for future work with formulae, inequalities, and algebraic reasoning across multiple strands of the curriculum. This Rounding and Estimating unit builds on pupils' prior experience with place value and rounding from Key Stage 2 and Year 7. Pupils learn to round numbers to powers of 10, a given	**Key Vocabulary:** equation, variable, inverse, balance, estimate, round, decimal place, significant figure, π (pi), radius, diameter, circumference, sector, sequence, term, nth term, linear, non-linear **Oracy:** Pupils use structured talk to explain steps in solving equations and justify rounding decisions (e.g. "I rounded to 2 significant figures because…"). In sequences, pupils

	Circles • Introduction to π • Calculate areas and circumferences of circles • Solve problems where you must calculate areas and perimeters of sectors. **Sequences** • Understand the mathematical definition of a sequence • Continue an array of linear and non-linear sequences • Work with linear sequences and their nth terms.		number of decimal places, and significant figures, using number lines to develop a strong conceptual understanding of approximation. They apply these skills to estimate the results of complex calculations, reinforcing number sense and mental strategies. This foundational understanding prepares pupils for future work on error intervals and bounds, where precision and estimation are key to interpreting and solving problems in real-world contexts. This unit on Circles introduces π as a mathematical constant and builds on pupils' prior understanding of perimeter and area. Pupils learn to calculate the circumference and area of circles, then apply these skills to solve problems involving sectors. Extension tasks include working backwards to find missing radii and solving real-world problems involving circular motion, such as wheel rotations and distances travelled by clock hands, preparing pupils for future work on arcs, angles, and compound measures. This unit on Sequences builds on pupils' earlier experiences of identifying number patterns and distinguishing between additive and multiplicative relationships. Pupils begin by continuing and describing linear sequences, then explore more complex types such as Fibonacci, geometric, quadratic, and cubic sequences. They develop fluency in identifying term-to-term rules and generalising linear sequences using nth term expressions, laying the foundation for future work on functions, graphs, and algebraic reasoning.	describe patterns and generalise using mathematical language. **Reading:** Interpreting worded problems involving rounding, estimation, and real-world circle contexts (e.g. travel distances, circular objects). Reading and analysing patterns in number sequences supports generalisation.

Spring - Half Term 3	**Ratio** • Understand ratios and use ratio notation • Simplify ratios and write in the form 1:n • Solve problems where quantities are shared within a ratio • Work with scale drawings and maps **Area and Volume** • Calculate the areas of polygons: squares, rectangles, triangles, parallelograms and trapezia and circles • Properties of 3D shapes • Problems involving volumes of prisms and cylinders. **Pythagoras' Theorem** • Introduction to Pythagoras and Pythagoras' Theorem • Solve problems involving Pythagoras' Theorem	A 30 minute in-class, calculator Key Topic Test based on: • Sequences • Ratio • Area and Volume	This Ratio unit builds on pupils' prior understanding of proportional reasoning and multiplicative relationships. Pupils begin by interpreting and representing ratios in numerical and verbal contexts, using correct notation and simplifying ratios to their simplest form. Bar models and ratio tables are used throughout to enhance conceptual understanding and support problem solving. Pupils apply their knowledge to a range of ratio problems, including sharing in a ratio when given the total, a part, or the difference, across both two- and three-part ratios. Links are made to fractions, percentages, and proportion, and pupils apply ratio reasoning in geometric contexts such as similar shapes, shaded areas, and scale drawings. This prepares them for more advanced work on direct and inverse proportion and compound measures. This unit on Area and Volume builds on prior work with area of polygons in Year 7 and circles earlier in Year 8. Pupils consolidate and apply these skills to solve more complex problems involving compound shapes and contextual scenarios. They extend their understanding of 3D shapes by exploring their properties and calculating volumes of prisms and cylinders. Conceptual understanding is supported through visual models and real-life applications. Extension tasks involve interpreting volume in terms of rates, such as filling swimming pools, preparing pupils for future work on compound measures and density.	**Key Vocabulary:** ratio, proportion, scale, simplify, part-to-whole, polygon, area, volume, prism, cylinder, base, height, hypotenuse, right-angled triangle, square root, surd, Pythagorean triple **Oracy:** Pupils explain how ratios are simplified and used in context, and justify their reasoning when solving geometric problems. In Pythagoras, pupils articulate chains of reasoning to explain why a triangle is or isn't right-angled. **Writing:** Pupils may write generalisations about patterns in Primitive Pythagorean triples. **Reading:** Interpreting scale drawings, contextual volume problems, and geometric scenarios involving right-angled triangles. Reading

			This unit on Pythagoras' Theorem builds on pupils' understanding of square numbers and roots, developed through prior work with area and algebra. Pupils begin by identifying the hypotenuse in right-angled triangles and manipulating square roots confidently, including leaving answers in surd form. They substitute into Pythagoras' Theorem to find missing sides—both hypotenuse and shorter sides—and recognise when a triangle satisfies the condition $a^2 + b^2 = c^2$, including identifying Pythagorean triples. Pupils are introduced to the converse of the theorem and apply it to determine whether a triangle is right-angled. They solve multi-step problems and apply the theorem in geometric contexts, including on coordinate grids, in compound shapes, and in problems involving perpendicular heights and algebraic expressions. Pupils also investigate patterns in Pythagorean triples to deepen conceptual understanding and reasoning.	and decoding worded problems supports application of mathematical reasoning.
Spring - Half Term 4	**Proportion** • Use ratio tables to solve problems involving direct proportion • Solve problems involving inverse proportion **Pie Charts** • Understand and Interpret Pie Charts	A 30 minute in-class, calculator Key Topic Test based on: • Pythagoras' Theorem • Proportion • Pie Charts	This unit on Proportion builds on pupils' understanding of multiplicative reasoning and scaling from earlier ratio work. Pupils use ratio tables to solve direct proportion problems in contexts such as recipes, currency conversions, and best buy comparisons, identifying both the functional multiplier (per unit) and the scalar multiplier (scaling up or down). They then explore inverse proportion through contextual problems and graphical representations, developing strategies to distinguish between direct and	**Key Vocabulary:** proportion, direct, inverse, multiplier, ratio table, pie chart, sector, angle, frequency, grouped data, ungrouped data, mean, median, mode, range, estimate

	• Construct a Pie Chart using a compass and protractor **Averages from a Frequency Table** • Understand and construct frequency tables for both ungrouped and grouped data • Find averages and the range from frequency tables		inverse relationships. This prepares pupils for more advanced work on proportional graphs, rates of change, and compound measures in Key Stage 4. This unit develops students' understanding of proportion through interpreting and constructing pie charts. Starting with calculating category values from sector angles, students apply angle and fraction knowledge in a proportional context. They then compare pie charts to reason about part-whole relationships, before working backwards to reconstruct frequency data. The sequence builds fluency in proportional reasoning and inverse thinking, with ratio tables supporting conceptual understanding where appropriate. This unit builds on prior knowledge of mean, median, mode, and range from raw data, extending it to ungrouped and grouped frequency tables. Students begin by interpreting ungrouped data, then explore grouped data, recognising the trade-offs in accuracy and clarity. They estimate the mean and identify the median class for grouped data, understanding these as approximations. Finally, they apply inverse reasoning to find missing values when given an average, deepening their grasp of statistical structure and preparing them for more advanced data analysis.	**Oracy:** Pupils explain proportional relationships using ratio tables and justify their choice of method (e.g. "I used the scalar multiplier because…"). In pie charts and averages, pupils describe reasoning when interpreting data and comparing categories. **Writing:** Opportunities to write explanations of how to estimate averages from grouped data and describe trends shown in pie charts. Pupils may also write reflections on the limitations of grouped data. **Reading:** Interpreting worded problems involving proportion and data representation. Reading and analysing pie charts and frequency tables supports development of statistical literacy.

Summer - Half Term 5	**Percentage Change** • Solve problems involving percentage increases and decreases using decimal multipliers **Angles in Parallel Lines** • Understand the angle relationships for Corresponding, Co-interior and Alternate Angles • Solve angle problems involving parallel lines whilst forming coherent chains of reasoning **Probability Trees** • Understand Relative Frequency and calculate Expectation • Use Frequency Trees to calculate basic probabilities • Understand that different approaches are need for probabilities of two or more events • Use Tree Diagrams to find probabilities of two or more events	End of Year KSA. (Knowledge and Skills Assessment) This will be a summative two 45-minute papers based on all the content covered so-far in Year 8. A 30 minute in-class, calculator Key Topic Test based on: • Averages from Frequency Tables • Percentage Change • Angles in Parallel Lines	This unit builds on Year 7 work with percentages, beginning with finding percentages of amounts with and without a calculator. Students then develop fluency with percentage multipliers to calculate increases and decreases, supported by ratio tables to show the link to decimal multipliers. They progress to solving reverse percentage problems and multi-step contextual problems involving fractions, ratio, and area. Bar models are introduced to support conceptual understanding, particularly for lower-attaining students. The sequence builds from procedural fluency to flexible problem-solving across representations. This unit builds on Year 7 angle rules, beginning with a recap of angles on a straight line, around a point, and vertically opposite angles. Students then investigate angle relationships in parallel lines, developing understanding of corresponding, alternate, and co-interior angles. They apply these rules to find missing angles and construct clear chains of reasoning using correct geometrical notation and language. Throughout, emphasis is placed on precise descriptions of angle positions relative to transversals and parallel lines, supporting both fluency and reasoning.	**Key Vocabulary:** percentage, increase, decrease, multiplier, reverse percentage, bar model, corresponding angles, alternate angles, co-interior angles, transversal, probability, event, outcome, tree diagram, independent, dependent, mutually exclusive **Oracy:** Pupils explain percentage change using decimal multipliers and justify their reasoning in multi-step problems. In geometry, they use precise language to describe angle relationships and construct chains of reasoning. In probability, pupils explain the difference between independent and dependent events and justify their use of tree diagrams.

			This unit builds on key Year 7 ideas, including calculating probabilities of single events, understanding that probabilities sum to 1, and interpreting sample space diagrams. Students then explore mutually exclusive events and expectation, before constructing and interpreting tree diagrams for both independent (with replacement) and dependent (without replacement) events. They learn to select appropriate methods for multi-event probabilities and distinguish between independent and dependent scenarios. Extension opportunities exists for solving problems involving algebraic expressions within tree diagrams, reinforcing both probability and equation-solving skills.	**Writing:** Opportunities to write structured justifications for angle problems and probability calculations. Pupils may also write explanations comparing different methods for solving percentage problems. **Reading:** Interpreting worded problems involving percentage change and probability scenarios. Reading and decoding geometric language in angle problems supports reasoning and accuracy.

Summer - Half Term 6	**Highest Common Factors and Lowest Common Multiple (HCF and LCM)** • Find the HCF and LCF of two or more numbers using prime factorisation **Scatter Graphs** • Introduction to bivariate data • Construct a scatter graph and describe correlation • Be able to identify outliers • Draw and use a line of best fit to make inferences about data sets • Understand the difference between correlation and causation • Understand the difference between extrapolation and interpolation	A 30 minute in-class, calculator Key Topic Test based on: • Probability Trees • HCF and LCM • Scatter Graphs	This unit builds on Year 7 knowledge of prime numbers, factors, multiples, and prime factor decomposition. Students begin by revisiting these concepts, then apply them to find the highest common factor and lowest common multiple of two or more numbers. They solve contextual problems to deepen understanding and recognise when each method is appropriate. The unit also introduces algebraic HCF and LCM, supporting the transition from numerical to algebraic reasoning. Prime factorisation is emphasised not only as a method for HCF and LCM, but as a foundational skill that supports simplifying surds, solving problems involving indices, and working efficiently across a range of mathematical topics. This Scatter Graph unit introduces students to bivariate data and how to represent and interpret relationships between two variables. Students begin by plotting scatter graphs and describing correlation, before identifying simple mathematical relationships and drawing lines of best fit. They explore outliers, distinguish between interpolation and extrapolation, and understand the difference between correlation and causation. The unit extends to calculating and interpreting the gradient of a line of best fit, reinforcing links to linear graphs and supporting both statistical and algebraic reasoning.	**Key Vocabulary:** factor, multiple, prime, prime factorisation, HCF, LCM, Venn diagram, simplify, surd, index, bivariate data, correlation, causation, outlier, line of best fit, interpolation, extrapolation, gradient **Oracy:** Pupils explain methods for finding HCF and LCM, including using prime factorisation and Venn diagrams. In statistics, they describe relationships between variables, justify the placement of lines of best fit, and discuss whether observed correlations imply causation. Pupils also explain the difference between interpolation and extrapolation when making predictions. **Writing:** Opportunities to write comparisons between methods for finding HCF and LCM, and to explain the

				meaning of correlation, causation, and the risks of extrapolating beyond known data. Pupils may also write interpretations of trends in scatter graphs and justify predictions. **Reading:** Interpreting worded problems involving common multiples/factors and real-world data sets. Reading and analysing scatter graphs supports development of statistical inference, including recognising when predictions are valid or speculative.