SHUTTLEWORTH COLLEGE

5-year Overview – Year 7

Brief overview
During year 7, students will not only develop on prior KS2 learning, but they will start to explore strands of algebra from September. They will apply knowledge of the four operations to contexts such are area and perimeter, money problems and real-life timetables. Shape will take up a lot of the summer term, allowing students to become more confident with specialist mathematical equipment.

Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit title	1. Sequences 2. Algebraic notation 3. Equality and equivalence	4. Place value and ordering integers and decimals 5. FDP equivalence 6. Addition & subtraction problems	7. Multiplication & division problems 8. Fractions & percentages of amounts	9. Directed number 10. Adding and subtracting fractions	11. Constructing, measuring and geometric notation 12. Geometric reasoning	13. Number sense 14. Sets and probability 15. Prime numbers and proof
Big question/ core concept	Types of sequences Algebraic notation, including inverse operations and substitution. Solving one-step equations and collect like terms.	Integer and decimal place value. Rounding numbers Range and median FDP equivalence Interpreting pie charts Calculations with the four operations	Calculations with the four operations HCF and LCM Area of shapes Order of operations Fractions and percentages of amounts.	Calculations with directed number. Solving equations Mixed numbers and improper fractions Adding and subtracting fractions	Notation for lines and angles Drawing and measuring lines and angles Parallel and perpendicular lines Types of triangles, quadrilaterals and polygons Constructing triangles Draw and interpret pie charts.	Estimation and rounding Metric measures and units Order of operations Set notation and Venn diagrams Language of probability Calculating probability Prime, square and triangle numbers Product of prime factors Powers and roots Conjectures and counterexamples
Knowing	**Sequences** Linear and non-linear sequences Numerical and diagram sequences Sequences on graphs – what do they look like? **Algebraic notation**	**Place value and ordering** Integer place value up to one billion Decimal place value to at least hundredths Intervals and number lines	**Multiplication and division** Multiply by 10, 100, 1000, 0.1 and 0.01 Mental and formal written methods of multiplication and division. HCF and LCM of small numbers.	**Directed number** Scale of directed numbers Four operations with directed number. Use a calculator with directed number.	**Constructing, measuring and geometric notation** Lettering and labelling notation for lines and angles. Draw and measure lines and angles accurately. Classify angles.	**Number sense** Mental arithmetic strategies Convert between metric measures and units Rounding to a given number of decimal places

	Algebraic notation Inverse operations Substitute into expressions **Equality and equivalence** What is equality? Fact families Solving equations Collect like terms	Round numbers to positive powers of ten Round numbers to one significant figure **FDP equivalence** Tenths and hundredths FDP equivalence for tenths and quarters Equivalent fractions **Addition and subtraction** Mental and formal written methods of addition and subtraction with integers and decimals.	Areas of triangles, rectangles and parallelograms. Order of operations. *HCF and LCM of algebraic expressions.* *Area of a trapezium* *Areas involving algebraic expressions.* **Fractions and percentages of amounts** Fractions and percentages of amounts, both with and without a calculator.	Solve two-step equations (with and without a calculator). **Adding and subtracting fractions** Tenths and hundredths on diagrams and number lines. Convert mixed numbers and improper fractions/ Adding and subtracting fractions with: same denominator, one denominator a multiple of the other, different denominators.	Identify and draw parallel and perpendicular lines. Types of triangle, quadrilateral and other polygons. **Geometric reasoning** Angles at a point, angles on a straight line and vertically opposite angles. *Understand and use parallel lines rules.*	*Understand and use surd notation* *Understand and use negative and simple fractional indices* *Use error interval notation* **Sets and probability** Understand and use set notation Understand and use the language of probability Calculate the probability of a single event. *Understand the complement of a set.* **Prime numbers and proof** Recognise prime, square and triangle numbers. Powers and roots.
Applying	**Sequences** Describe and continue sequences in diagram and number forms, both linear and non-linear. Compare numerical and graphical forms. **Algebraic notation** Use single function machines and series of two function machines with numbers and letters. Generate sequences using substitution. Represent functions graphically. **Equality and equivalence** Form and solve equations Equivalence of algebraic expressions	**Place value and ordering** Compare and order numbers Range and median of a set of numbers. *Standard index form* **FDP equivalence** Interpret pie charts Convert between other fractions, decimals and percentages from known facts. *Fractions above one* *Multiple of one eighth to decimals and percentages.* **Addition and subtraction** Choosing the most appropriate method of addition and subtraction. Solve problems in the context of perimeter, money and frequency trees and tables. Solve problems in the context of bar charts and line charts. *Addition of numbers given in standard form.*	**Multiplication and division** Convert metric units Mean of a set of numbers. **Fractions and percentages of amounts** *Fractions greater than 1.*	**Directed number** Order directed numbers, both in contextualised and abstract situations. Use the order of operations. *Negative square roots* *Higher powers.* **Adding and subtracting fractions** Add and subtract fractions and decimals.	**Constructing, measuring and geometric notation** Construct triangles given SSS, SAS, ASA. Draw and interpret pie charts. **Geometric reasoning** Calculate missing angles in triangles and quadrilaterals. *Sum of angles in any polygon.* *Simple proofs using angle rules.*	**Number sense** Use known facts to derive other facts. Evaluate an algebraic expression given a related fact. Use estimation Use the order of operations *Convert between units of area and volume* **Sets and probability** Draw and interpret Venn diagrams Use the sum of probabilities of an event is 1. **Prime numbers and proof** Express a number as a product of prime factors. Make and test conjectures. Understand and use counterexamples. *Use prime factors to find HCFs and LCMs.*

Assessment	Unit assessment /20 for each topic.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic. Mid-year assessment covering content since September.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic. End of Year assessment covering content from across the year.

SHUTTLEWORTH COLLEGE

5-year Overview – Year 8

Brief overview						
In Year 8, students will build on previous KS3 learning, with a particular focus on ratio and proportion initially. Students will also take their first real look at data handling and representation during the course of the year, whilst also revisiting and developing their algebraic skills and knowledge of geometry.						
Term	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Unit title	1. Ratio and scale 2. Multiplicative change 3. Multiplying and dividing fractions	4. Cartesian plane 5. Representing data 6. Tables and probability	7. Brackets, equations and inequalities 8. Sequences 9. Indices	10. Fractions and percentages 11. Standard index form	13. Angles in parallel lines and polygons 14. Area of trapezia and circles 15. Line symmetry and reflection	16. The data handling cycle 17. Measures of location
Big question/ core concept	Ratio notation Circumference of a circle Scale factors linked to ratio Currency conversion Scale diagrams and maps Multiplying and dividing fractions	Straight line graphs – plot and interpret Equation of a straight line Direct proportion and its equation Direct proportion graphically Scatter graphs Types of data One and two-way tables Sample space diagrams Probabilities from tables and Venn diagrams	Expanding and factorising with single brackets Expressions, equations, formulae and identities Form and solve equations and inequalities Generate sequences with more complex rules Index laws	Percentage increase and decrease Using multipliers Standard form – writing and calculations	Parallel lines and angles Interior and exterior angles in polygons Prove simple geometric facts Area of a trapezium Area of a circle and circle parts Area of compound shapes Reflections in horizontal, vertical and diagonal lines	Primary and secondary sources of data Collecting, interpreting and representing data Pie charts Comparing distributions Median, mean and mode Averages from tables

Knowing	**Ratio and scale** Understand ratio and link to multiplication. Ratio notation Writing ratios in their simplest form **Multiplicative change** Use scale factors, linking to ratio Draw scale diagrams **Multiplying and dividing fractions** Multiply and divide a fraction by an integer Multiply and divide a fraction by a fraction Understand and use the reciprocal	**Cartesian plane** Plot and interpret straight line graphs Equation of a straight line *Find the mid-point of a line segment* *Explore gradient* *Explore non-linear graphs* **Representing data** Draw scatter graphs Understand correlation Understand grouped and ungrouped, discrete and continuous data **Probability** List outcomes using sample space diagrams for one and two events	**Brackets, equations and inequalities** Expand and factorise into single brackets Distinguish between equations, expressions, formulae and identities *Expand and pair of binomials* **Sequences** *Find the rule for the nth term of a linear sequence* **Indices** Understand and use the addition and subtraction rules.	**Fractions and percentages** Develop understanding of fractions, decimals and percentages. Express one number as a percentage of another. **Standard index form** Convert between numbers in ordinary and standard form	**Parallel lines and polygons** Basic angle rules Angles on parallel lines Geometric notation Angles in special quadrilaterals *Perform standard constructions including perpendiculars* *Understand and use the properties of diagonals of quadrilaterals* **Area of trapezia and circles** Area of shapes, including trapezia and circles **Line symmetry and reflection** Recognise line symmetry in polygons and other shapes	**Data handling cycle** Primary and secondary sources of data Construct statistical diagrams, including multiple bar charts Construct pie charts **Measures of location and dispersion** Median and mean Mode and modal class *Explore histograms for unequal groups*
Applying	**Ratio and scale** Solve ratio problems Circumference of a circle *Ratio in the form 1:n* **Multiplicative change** Solve simple direct proportion problems Currency conversion, including on graphs Interpret scale diagrams and maps *Explore direct proportion graphs* **Multiplying and dividing fractions** *Multiply and divide mixed numbers* *Multiply and divide simple algebraic fractions*	**Cartesian plane** Use the equation of a straight line, including lines parallel to the axes. Make links between direct proportion and straight lines of the form y = kx Model situations by translating them into expressions, formulae and graphs. **Representing data** Interpret scatter graphs Draw and use lines of best fit Design and use one and two-way tables **Probability** Find probabilities using tables and Venn diagrams *Use the product rule for counting*	**Brackets, equations and inequalities** Form and use expressions, formulae and identities Form and solve equations and inequalities with and without brackets *Solve equations and inequalities with unknowns on both sides* **Sequences** Generate sequences using more complex rules, both in words and algebraically. **Indices** Form expressions using indices *Explore power of powers.*	**Fractions and percentages** Evaluate percentage increases and decreases. Use multipliers to solve percentage problems. *Finding the original given any percentage* **Standard index form** Compare numbers given in standard form Calculate with numbers given in standard form, with and without a calculator.	**Parallel lines and polygons** Find and use the sum of interior and exterior angles of a polygon Prove simple geometric facts **Area of trapezia and circles** Area of parts of a circle Calculate the area of compound shapes **Line symmetry and reflection** Reflect shapes in horizontal, vertical and diagonal lines	**Data handling cycle** Collect data, using questionnaires Interpret statistical diagrams, including multiple bar charts Interpret pie charts Compare distributions using graphs Identify misleading graphs **Measures of location and dispersion** Finding the total given the mean. Find the mean of grouped data Choose the appropriate averages Comparing distributions using measures *Find unknown data values given the mean or changes in the mean* *Find the median from a table of values*
Assessment	Unit assessment /20 for each topic.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic. Mid-year assessment covering content since September and Y7.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic. End of Year assessment covering content from across years 7 & 8.

SHUTTLEWORTH COLLEGE

5 year Overview – Year 9

Brief overview
During year 9, students start to reason with their knowledge from years 7 and 8. They further their understanding of algebra, number, geometry and proportion through solving problems graphically, numerically and algebraically. Students also experience a whole topic dedicated to money and real life financial skills, such as wage slips, debit and credit, and tax. Students also look at constructions in shape, and have their first taste of Pythagoras' Theorem.

Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit title	1. Forming and solving equations 2. Straight Line Graphs 3. Testing conjectures	4. Three-dimensional shapes 5. Constructions and congruency 6. Numbers	7. Using percentages 8. Maths and money	9. Deduction 10. Rotation and translation 11. Pythagoras' Theorem	12. Enlargement and similarity 13. Solving ratio & proportion problems 14. Rates	15. Probability 16. Algebraic representation
Big question/ core concept	Interpret straight line graphs Equation of a straight line in the form y=mx + c nth term rule for sequences Solving equations and inequalities with unknowns on both sides Change the subject of a formula Conjectures	Faces, edges and vertices Names of common 2D and 3D shapes Volume and surface area of cuboids and cylinders Volume of any prism Construct 3D shapes from nets Construct nets Construct perpendiculars and bisectors Congruency Types of number – including rational and real numbers Fraction arithmetic HCF and LCM Standard form	Percentage increase and decrease Percentage change Reverse percentage problems Financial maths including bills, bank statements, interest, best buys	Angles rules, including special quadrilaterals Angles using algebra Order of rotational symmetry Rotation Translation using vectors Pythagoras' Theorem	Enlarge shapes by a positive scale factor Calculate the length of sides in similar shapes Direct proportion problems and graphs Conversion graphs Ratio problems Inverse proportion Unit pricing problems (best buys) Speed, distance time Density, mass, volume Compound units	Relative frequency Independent events Quadratic graphs and equations Other graphs Representing inequalities

Knowing	**Straight line graphs** Find and use the equation of a straight line Reduce equations to the form y = mx + c nth term rule of a sequence *Solve a pair of simultaneous equations using graphical methods* *Explore the gradients of perpendicular lines* **Forming and solving equations and inequalities** Change the subject of a formula **Testing conjectures** Conjectures and counterexamples	**Three dimensional shapes** Language of faces, edges and vertices Names of common prisms and non-prisms Work out the volume and surface area of cuboids and cylinders *Explore volume of cones, spheres and complex shapes* **Constructions and congruency** Construct 3D shapes from nets and construct the net of a given 3D shape Construct and use scale drawings Construct perpendiculars and bisectors Understand congruency **Numbers** Revisit types of number – extend to include rational and real numbers Fraction arithmetic Standard form	**Using percentages** Percentage increase and decrease Percentages over 100% Find percentage changes **Mathematics and money** Financial maths	**Deduction** Angle rules, including within special quadrilaterals **Rotation and translation** Identify the order of rotational symmetry of a shape Translate points and shapes by a given vector **Pythagoras' Theorem** Identify the hypotenuse of a right-angled triangle Calculate missing sides in right-angled triangles	**Enlargement and similarity** Enlarge shapes by a positive scale factor, including from a given points Calculate the lengths of missing sides in similar shapes **Solving ratio and proportion problems** Direct proportion problems and graphs Conversion graphs Simple inverse proportion **Rates** Work with speed, distance, time	**Probability** Relative frequency Independent events **Algebraic representation** Drawing and reading from quadratics Representing inequalities
Applying	**Straight line graphs** Interpret straight line graphs Compare graphs to linear sequences and their rule **Forming and solving equations and inequalities** Solve equations and inequalities with unknowns on both sides using contexts such as angles, probability, etc. *Change the subject of a complex formula* **Testing conjectures** Test conjectures in a wide range of contexts.	**Three dimensional shapes** Identify 2D shapes within 3D shapes Work out the volume of any prism Work out missing lengths given area and/or volume *Work out the surface area of any prism* **Constructions and congruency** Explore congruency via construction *Explore the locus of a path* **Numbers** Extend knowledge of HCF and LCM	**Using percentages** Use multipliers in a variety of contexts Solve reverse percentage problems *Work with repeated percentage change* **Mathematics and money** Bills and bank statements Interest Unit pricing (best buying)	**Deduction** Find angles using algebraic methods Use chains of reasoning to evaluate angles *Develop more complex geometrical proofs* **Rotation and translation** Find the result of rotating shapes Understand variance and invariance in the context of transformations *Find the result of a series of transformations* **Pythagoras' Theorem** Determine whether a triangle is right-angled *Explore proofs of Pythagoras' Theorem* *Use Pythagoras' theorem in 3D shapes*	**Enlargement and similarity** *Enlarge shapes by a negative scale factor* *Similar triangles – exploring ratios in right-angled triangles* **Solving ratio and proportion problems** Solve ratio problems given the whole or a part Unit pricing problems (best buys) *Inverse proportion graphs* **Rates** Solve problems involving density Work with compound units *Converting compound measures*	**Probability** Expected number of outcomes *Tree diagrams* **Algebraic representation** Interpreting other graphs e.g. reciprocal and piece-wise *Graphical solution of simultaneous equations*

Assessment	Unit assessment /20 for each topic.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic. Mid-year assessment covering content since September and KS3.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic. End of Year assessment covering content from across KS3.

SHUTTLEWORTH COLLEGE

5-year Overview – Year 10

Brief overview
Students in year 10 start their GCSE course, building on their KS3 studies. They begin the year with a large amount of trigonometry, allowing them to consolidate this later in the year during topics such as bearings. Algebra and proportion still focus heavily throughout the year, ensuring students are confident with the skill sets required at GCSE level. Summer term looks at data collection, representation and interpretation, before some final work reviewing core concepts of number, including sequences and index laws.

Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit title	1. Congruence, similarity and enlargement 2. Trigonometry	3. Representing solutions of equations and inequalities 4. Simultaneous equations	5. Angles and bearings 6. Working with circles 7. Vectors	8. Ratios and fractions 9. Percentages and interest 10. Probability	11. Collecting, representing and interpreting data	12. Non-calculator methods 13. Types of number and sequences 14. Indices and roots
Big question/ core concept	Congruence and similarity Enlargement Missing sides in similar shapes, including pairs of triangles Conditions of congruency Trigonometric ratios Missing lengths and angles in right-angled triangles Exact values of key angles *Area and volume of similar shapes* *3D trigonometry* *Sine and cosine rules* *Area of a non right angled triangle*	Form and solve equations and inequalities Represent solutions to inequalities and equations Solving simultaneous equations graphically and algebraically *Set notation* *Identifying regions with two variables* *Quadratic equations and inequalities* *Linear and quadratic simultaneous equations*	Angle rules Bearings Area and circumference of circles Arc length and sector area Areas and volumes of cylinders, cones, spheres, etc. Vector notation, arithmetic and translations *Circle theorems* *Equation of a circle* *Geometric proofs with vectors*	Ratio problems and best buys Currency conversion Percentages and percentage changes Interest and depreciation Find original values Theoretical and experimental probability Mutually exclusive and independent events Tree diagrams Probabilities from tables *Area and volume ratios* *Iterative methods* *Conditional probabilities*	Sampling Time series data Grouped and ungrouped data Scatter graphs – correlation, line of best fit, extrapolation Frequency polygons Measures of location and dispersion Comparing distributions using statistical diagrams *Cumulative frequency diagrams, boxplots and histograms* *Quartiles, including the interquartile range*	Four operations with integers, decimals and fractions Exact answers Percentage calculations Factors, multiples, primes Prime factorisation Sequences Powers and roots; index laws Standard form *Surds* *Quadratic nth term* *Recurring decimals* *Limits of accuracy*

Knowing	**Congruence, similarity and enlargement** Difference between congruence and similarity Enlarge a shape about a given point; understand and use similarity *Area and volume of similar shapes* **Trigonometry** Understand trigonometric ratios *Derive and use the sine and cosine rules*	**Representing solutions of equations and inequalities** Represent solutions to inequalities on a number line Represent solution to equations graphically *Use set notation for solutions* *Solve quadratic equations and inequalities by factorising* **Simultaneous equations** Understand the meaning of solution, appreciating that some equations have multiple solutions Form and solve a pair of linear simultaneous equations graphically Form and solve a pair of linear simultaneous equations algebraically	**Angles and bearings** Basic angle rules Understand and use bearings **Working with circles** Area and circumference of circles Name parts of a circle and perform related calculations Find areas and volumes related to circles – cylinders, cone, sphere, etc. *Derive the first four circle theorems.* *Understand and use the equation of a circle* **Vectors** Understand vector notation Vectors and translations	**Ratio and fractions** Fractions in ratios Fractions from ratios Currency conversions **Percentages and interest** Convert fractions, decimals and percentages Calculate simple and compound interest *Use iterative methods* **Probability** Single event probability – comparing theoretical and experimental Understand and work with mutually exclusive and independent events	**Collecting, representing and interpreting data** Understanding sampling and its limitations Construct tables and line graphs for time series data Understand and identify correlation Construct frequency polygons Evaluate measures of location and dispersion *Construct cumulative frequency diagrams, box-plots and histograms*	**Non-calculator methods** Calculations with percentages *Calculate with surds* **Types of number and sequences** Factors, multiples, primes and prime factorisation Recognise arithmetic and geometric sequences *nth term of a quadratic sequence* **Indices and roots** Rules of indices *Understand and use fractional indices* *Work with rational and irrational numbers, including recurring decimals*
Applying	**Congruence, similarity and enlargement** Find missing sides in similar shapes including pairs of similar triangles Understand and use the conditions for a pair of congruent triangles *Formal proof of congruency of triangles* *Enlarge a shape by a negative scale factor* **Trigonometry** Work out missing lengths and angles in right-angled triangles Know and use exact values of key angles *Use trigonometry in 3D shapes* *Use the formula 1/2abSinC to find the area of non-right-angled triangles.*	**Representing solutions of equations and inequalities** Form and solve equations and inequalities in a variety of contexts, including with unknowns on both sides *Solve inequalities in two variables, identifying regions* **Simultaneous equations** *Solve simultaneous equations with one linear and one quadratic*	**Angles and bearings** Use bearings **Working with circles** *Use and prove the first four circle theorems.* **Vectors** Vector arithmetic – addition, subtraction and multiplication by a scalar *Construct geometric proofs with vectors*	**Ratio and fractions** Use ratios, including with mixed units Combining ratios Unit pricing (best buys) *Revise area and volume ratios* **Percentages and interest** Find percentages and percentage changes Find one number as a percentage of another Evaluate exponential change e.g. depreciation Find original values **Probability** Construct and interpret tree diagrams Find probabilities from frequency trees, tables and Venn diagrams *Calculate and interpret conditional probabilities.*	**Collecting, representing and interpreting data** Interpret tables and line graphs for time series data Represent grouped data Use lines of best fit, understanding the dangers of extrapolation Interpret frequency polygons Use statistical diagrams and measures to compare distributions *Interpret cumulative frequency diagrams, box-plots and histograms* *Understand quartiles; use and interpret the inter-quartile range*	**Non-calculator methods** Use four operations with integers, decimals and fractions with and without context Work with exact answers, e.g. area and volume **Types of number and sequences** Recognise and use other sequences **Indices and roots** Work out powers and roots Calculate with numbers in standard form *Work with limits of accuracy, including upper and lower bounds*
Assessment	Unit assessment /20 for each topic.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic. Mid-year assessment covering content since September and KS3.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic. End of Year assessment covering content from across KS3 and Y10.

SHUTTLEWORTH COLLEGE

5-year Overview – Year 10 Bespoke

Brief overview
Students following the Year 10 Bespoke pathway will follow a different Scheme of Work compared to their peers. The content of the topics will remain the same, however the order has been changed to be more suitable to the needs of these students. Students start with a recap and development of key algebraic skills before moving on to work with percentages, ratio and fractions. In the Spring term Bespoke pathway students will be spending some time developing non calculator methods and exploring straight line graphs before looking at probability and rounding and estimation. The Summer term starts by looking at perimeter area and volume, before progressing to handing data and working with angles. The year finishes with students exploring graphs and diagrams before finishing the year looking at vectors. Students will be working towards their Entry Level Maths qualification throughout the year. The students following this pathway will explore skills such as simultaneous equations and trigonometry when appropriate in Year 11.

Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit title	1. Algebraic Manipulation 2. Equations, inequality and formulae 3. Quadratic expressions and equations	4. Percentages 5. Ratio and Scale 6. Fractions	7. Non calculator methods 8. Straight line graphs	9. Probability 10. Rounding and estimation	11. Perimeter, area and volume 12. Interpret and represent data	13. Angles 14. Graphs and diagrams 15. Vectors
Big question/ core concept	Substitution Simplifying algebraic expressions Index Laws Expanding and factorising single brackets Solving equations Working with inequalities Subject of the formula Expanding and factorising double brackets	Percentage of amounts Increase / decrease by a percentage Express change as a percentage Reverse percentages Interest Working with ratio / sharing ratio Ratio and fractions Ratio and scale	Place value and ordering number Key operations with number Directed number Order of operations Related calculations Multi-step problems Plotting straight line graphs Working with gradients Exploring properties of lines	Probability of events Listing outcomes Relative frequency Sample space & two-way tables Independent events Tree diagrams Rounding decimals Rounding significant figures Estimation	Properties of shapes Area of shapes Working with circles, area and circumference Volume of prisms Nets and surface area Averages and range Averages from tables Types of data and handling data	Angles in triangles and quadrilaterals Interior and exterior angles in polygons Angles in parallel lines Pictograms & charts Pie charts Frequency polygons Stem and leaf Vector notation

	Quadratic graphs	Fraction of amounts Increase / decrease by a fraction Fraction arithmetic Problems with fractions	Midpoints of line segments Equations of a line		Scatter graphs	Translation Vector calculations
Knowing	**Algebraic Manipulation** Know how substitute into expressions and formulae Know how to simplify algebraic expressions thorough collecting like terms and multiply and dividing. Know the laws of indices including power of powers. Know how to fluently expand and factorise single brackets. **Equations, inequalities and formulae** Know how to solve equations including those involving brackets, fractions and variables on both sides. Know how to work with inequalities Know how to make a variable the subject of a formula. **Quadratic expressions and equations** Know how to expand double brackets Know how to factorise and solve quadratic equations Know how to plot a quadratic graph	**Percentages** Know how to calculate with percentages including increase and decrease. Know how to express as a percentage including percentage change and as a fraction of another. Know how to find the original value after a percentage change. Know how to calculate with simple and compound interest. **Ratio and scale** Know how to share into a ratio including the total, given a part or the difference. Know how to link ratio and fractions. Know how to work with ratio and scales. **Work with fractions** Know how to find fractions of amounts including increase and decreasing by a fraction. Know how to add, subtract, multiply and divide fractions.	**Non-calculator methods** Know how to compare and order numbers using place value. Know how to add, subtract multiply and divide integers and decimals. Know how to work with directed number. Know how to apply the order of operations. **Straight line graphs** Know how to plot a straight-line graph. Know how to find solutions using a straight-line graph. Know how to calculate the gradient and the mid-point of a line segment. Know how to find the equation of a straight-line graph.	**Probability** Know how to find the probability of a single event. Know how to list outcomes of an event. Know how to work with sample space diagrams, two-way tables and frequency trees. Know how to create and complete tree diagrams from independent events. **Rounding and estimation** Know how to round to a given decimal place. Know how to round to a given number of significant figures. Know how to fluently use a calculator.	**Perimeter, area and volume** Know names and properties of 2D and 3D shapes. Know how to find the area of 2D shapes. Know how to find the circumference and area of circles. Know how to find the volume of a prism. Know how to find the surface area of a prism. **Interpret and represent data** Know how to find the key averages and the range. Know how to work with averages in grouped and un-grouped frequency tables. Know the various types of data Know how to plot a scatter graph.	**Angles** Know key angles facts. Know how to find missing angles in triangles and quadrilaterals. Know how to find the sum of interior angles. Know the key angle rules around parallel lines. **Graphs and diagrams** Know how to create a pictogram Know how to create a bar chart Know how to draw a pie chart Know how to plot a frequency polygon Know how to create and interpret a stem and leaf diagrams. **Vectors** Know how to understand and represent vectors including vector notation. Know how to translate by a given vector. Know how to add and subtract vectors.
Applying	**Algebraic Manipulation** Solve problems involving substitution Simplify algebraic expressions in context of problems Apply the laws of indices fluently. Reason with expanding and factorising brackets. **Equations, inequalities and formulae**	**Percentages** Solve problems involving percentages. Use percentage change in context Solve problems involving reverse percentages. Work fluently with simple and compound interest and compare the results of them. **Ratio and scale** Solve problems involving a mixture of sharing ratio skills.	**Non-calculator methods** Reason with place value Solve single and multi-step problems involving the four operations. Solve problems involving directed number. Work with related calculations. **Straight line graphs** Plot a variety of straight-line graphs given in different forms.	**Probability** Reason and solve problems around single event probability including probabilities summing to one. Work with relative frequency in context. Answers questions in context around sample space diagrams, two-way tables and frequency trees. Answer questions in context of probability tree diagrams.	**Perimeter, area and volume** Solve problems in context involving area and perimeter of 2D shapes. Work with area of compound shapes. Solve problems involving area and circumference of circles. Solve problems involving volume and surface area of 3D shapes. **Interpret and represent data** Reason and compare data using averages.	**Angles** Solve problems involving key angles facts. Solve multi-step angle problems. Work with interior and exterior angles in polygons. Solve problems involving angles in parallel lines. **Graphs and diagrams** Reason with pictograms and bar charts, including dual and composite bar charts.

	Solve equations in context including worded problems and equations with shapes. Solve inequalities and apply to number lines. Use subject of the formula in real life context. **Quadratic expressions and equations** Expand double brackets including a mix of positive and negative terms. Factorise into double brackets including positive and negative terms. Solve quadratic equations Work with quadratic graphs and identify key points such as roots and turning points.	Use ratio and fractions to make comparison. Use ratio and scales in context of scale diagrams and maps. **Work with fractions** Solve problems involving fractions of amounts. Use fractional arithmetic in context of problems and shape.	Compare and reason with graphs when given in the form y = mx + c Work with real life graphs.	**Rounding and estimation** Estimate answers to calculations using rounding. Solve multi-step problems involving a calculator. Work with error intervals.	Fluently work with averages within the context of data tables. Interpret and reason with data represented on scatter graphs.	Interpret pie charts. Work fluently and apply averages to stem and leaf diagrams. **Vectors** Reason with vector notation Translate shapes by a given vector. Describe a translation using vector notation. Solve problems involving adding and subtracting of vectors.
Assessment	Unit assessment /20 for each topic.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic. Mid-year assessment covering content since September and KS3.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic.	Unit assessment /20 for each topic. End of Year assessment covering content from across KS3 and Y10.

SHUTTLEWORTH COLLEGE

5-year Overview – Year 11

Brief overview
In year 11, students embed their year 10 learning, whilst also starting to reach the top grades for their tier of entry. They look at some more fundamental graph and algebra work during the first term, before using the second term to finalise their mathematical reasoning and communication skills. Throughout the year, we also complete regular past and practice papers through walking-talking mocks and unseen papers, preparing students for their final exams.

Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit title	1. Gradients and lines 2. Non-linear graphs 3. Using graphs	4. Expanding and factorising 5. Changing the subject 6. Functions	7. Multiplicative reasoning 8. Geometric reasoning 9. Algebraic reasoning	10. Transforming and constructing 11. Listing and describing 12. Show that…	Revision and exams	Revision and exams
Big question/ core concept	Equations of straight lines Quadratic graphs – plot, read and find roots Cubic and reciprocal graphs Reflections Speed, distance, time graphs Real-life-graphs *Exponential graphs* *Equations of perpendicular lines* *Equation of tangent to a curve* *Area under a curve*	Expand and factorise linear and quadratic expressions Solve quadratic equations Simplify algebraic expressions Solve linear equations Change the subject of a formula Volume of a pyramid Inputs and outputs Kinematics formulae	Scale and enlargement Direct and inverse proportion Pressure and density Angle facts and chains of reasoning Pythagoras' Theorem and trigonometric ratios Index laws nth term rule and sequences	Transformations of shapes Constructions & loci Sample spaces and probability Venn diagrams Plans and elevations Comparing distributions Justify answers Language of angle rules Conditions for congruent triangles *Product rule for counting* *Trigonometrical graphs* *Transforming functions* *Proof with congruent triangles*	Teachers will work on past papers and topics that have been identified that need further attention. Key topics will include: Number work, including multi-step problem solving Forming and solving equations and inequalities Working with formulae that students are expected to know e.g. area and volume formulae Probability	

Knowing	**Gradients and lines** Find and use equations of straight lines **Non-linear graphs** Plot and read from quadratic curves Plot cubic and reciprocal graphs *Understand and use exponential graphs* **Using graphs** Reflect shapes in a given line Construct speed, distance and time graphs Construct real-life graphs	**Expanding and factorising** Expand a single bracket and binomials Factorise into a single bracket Factorise quadratics of the form $x^2 + bx + c$ **Changing the subject** Solving linear equations Volume of a pyramid **Functions** Find inputs and outputs Function notation Trigonometric functions *Composite and inverse functions*	**Multiplicative reasoning** Scale and enlargement Direct and inverse proportion Pressure and density **Geometric reasoning** Angle facts Pythagoras' Theorem Vectors *Circle theorems* **Algebraic reasoning** Simplify complex expressions nth term rule *nth term of a quadratic*	**Transforming and constructing** Transformations of shapes Perform standard constructions using ruler and protractor or ruler and compasses *Understand and use trigonometrical graphs* **Listing and describing** Sample spaces and probability Complete and use Venn diagrams Work with plans and elevations **Show that…** Illustrate equivalence, numerically and algebraically		
Applying	**Gradients and lines** *Understand and use equations of perpendicular lines* **Non-linear graphs** Understand and find roots *Find the equation of tangent to a curve* *Estimate the area under a curve* **Using graphs** Interpret speed, distance and time graphs Interpret real-life graphs	**Expanding and factorising** Solve quadratic equations Simplify complex algebraic expressions including algebraic fractions *Solve quadratic equations by completing the square and using the quadratic formula* **Changing the subject** Change the subject of a formula *Change the subject of a formula where the subject appears more than once* *Solve equations by iteration* **Functions** Show algebraic expressions are equivalent; substitution *Solve quadratic inequalities*	**Multiplicative reasoning** Determine whether a problem requires additive or multiplicative reasoning **Geometric reasoning** Chains of reasoning with angles Using trigonometric ratios **Algebraic reasoning** Use rules for sequences Solving linear simultaneous equations *Simultaneous equations with one quadratic* *Formal algebraic proof* *Inequalities in two variables*	**Transforming and constructing** Solve loci problems *Transformations of functions* **Listing and describing** Work with organised lists Use data to compare distributions *Product rule for counting* **Show that…** Justify answers Use the language of angle rules Use the conditions for congruent triangles *Formal proof with congruent triangles*		
Assessment	Walking talking mock papers	Walking talking mock papers Unseen exam paper Mock exams	Walking talking mock papers Unseen exam paper	Practice papers Mock exams	Practice papers	Final exams