Alcester Academy Curriculum Planning: Key Stage 4 (Year 9) HIGHER

Department:	**Maths**		**Year Group: 9**				
Term	Topic/ subject	Assessment Objectives	Knowledge acquisition	Skill building ***Intent***	Wider reading opportunities to include numeracy and SMSC	Final assessment task and title	SEND & PP Identify where access and learning is supported
Autumn term 1	Unit 1a Calculations, Checking and Rounding. (5 hours)	Use all four operations on whole and decimal numbers. Use rounding effectively to nearest number, decimal place or significant figure. Use the product rule for counting.	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Estimate answers to one- or two-step calculations, including use of rounding numbers and formal estimation to 1 significant figure: mainly whole numbers and then decimals. Problems that include providing reasons as to whether an answer is an overestimate or underestimate. Missing digits in calculations involving the four operations.	Introduction to the historical and cultural context of the key ideas concepts such as use of Napier Bones for multiplication. Much of this work is building on previous knowledge through application in real life or problem solving scenarios to encourage students to develop resilience in working on maths problems.	Within 1st assessment end of October/ early November	Use of manipulatives and non-examples to concrete knowledge and understanding. Regular recall strategies every lesson.
	Unit 1a/b Indices, Roots, Reciprocals, hierarchy of operations (8 Hours)	Find values of numbers to an index including zero index. Use the rules of indices including multiply, divide and brackets to solve problems both with numbers and algebra.		Use index laws to simplify algebraic expressions. Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers, fractional and negative powers, and powers of a power.	Number fluency through easily converting between fractions, decimals and percentages is a useful skill in making more complex topics easier to understand, especially in problem solving contexts, which is essential in helping students make informed decisions in life.	Within 1st assessment end of October/ early November	
	Unit 1c Factors, Multiples, Primes. (4 hours)	Identify Factors, Multiples and Primes. Use factor decomposition include prime factors. Find the HCF and LCM between numbers		Solve problems using HCF, LCM and prime numbers. Understand that the prime factor decomposition of a positive integer is unique, whichever factor pair you start with, and that every number can be written as a product of prime factors. Write a number as a product of its prime factors.	The history of mathematical concepts will be explored.	Within 1st assessment end of October/ early November	
	Unit 1d Standard Form (8hours)	Convert between standard form and normal for both large and small numbers. Use all four operations with standard form. Use a calculator effectively with standard form.		Know how to convert numbers to and from standard form. Use Standard form numbers with and without a calculator. Calculations to include multiply, divide, Add and Subtract. Multiple calculations with Standard form numbers.	Links to Science and space exploration or microbiology	Within 1st assessment end of October/ early November	

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Autumn term 2	Unit 2a Algebra – The basics. (10 hours)	Use and interpret algebraic notation including the use of surds and standard form. Use substitution into formulas and expressions. Combine like terms, multiply brackets, factorise single and double brackets including the difference of two squares. Use powers and algebra	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Methods to understand expressions, eg there are '*b*' boys and '*g*' girls in a class, what is the total '*t*' number of students in the class. Forming expressions and equations using area and perimeter of 2D shapes. Evaluate statements and justify which answer is correct by providing a counter-argument by way of a correct solution. Factorise quadratic expressions using the difference of two squares.	The use of algebra to form the "general case" allows students to see how mathematics is useful in real-life. Additionally throughout the course the students will learn how to organise their work in a systematic way, so that it can be understood by others as well as themselves to enable them to communicate mathematically.	Within 1st assessment end of mid Autumn Term	Non-examples to concrete knowledge and understanding. Regular recall strategies every lesson
	Unit 2b Setting up, rearranging and solving equations. (8 hours)	Rearrange and substitute into formulae to alter a subject. Solve equations including unknowns on both sides, and brackets. Use simple algebraic proof.		Change the subject of a formula when one or two steps are required. Forming and solving equations involving algebra and other areas of mathematics such as area and perimeter.		Within 2nd assessment early Spring Term	non-examples to concrete knowledge and understanding. Regular recall strategies every lesson
Spring term 1	Unit 8a Transformations (9 hours)	Recognise, describe and draw rotations giving centre of rotation, direction and number of degrees. Use reflections of shapes including simple equations of straight lines. Use translations defined by a column vector. Enlarge shapes through a scale factor enlargement and centre of enlargement. Identify a scale factor, and area scale factors. Use congruence of shapes within transformations, and combinations of transformations.	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Recognise similar shapes because they have equal corresponding angles and/or sides scaled up in same ratio. Understand that translations are specified by a distance and direction (using a vector). Recognise that enlargements preserve angle but not length. Understand that distances and angles are preserved under rotations, reflections and translations so that any shape is congruent to its image. Understand that similar shapes are enlargements of each other and angles are preserved. Describe and transform 2D shapes using combined rotations, reflections, translations, or enlargements. Describe the changes and invariance achieved by combinations of rotations, reflections and translations.	Use of **key words:** Transformation, rotation, reflection, enlargement, translation, single, combination, scale factor, mirror line, centre of rotation, centre of enlargement, column vector, vector, similarity, congruent, angle, direction, coordinate, describe SMSC links: Multi-cultural links to carpet designs using transformations can be made. The use of formal mathematical language is encouraged when describing transformations.		Use of visual aids to support Regular recall strategies. Topic resources, such as tracing paper and mirrors used to support understanding.

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	Unit 4a Fractions. (8 hours)	Know how to express a number as a fraction of another. Compare and simplify fractions, and identify equivalent fractions. Find a fraction of an amount, convert between fractions and decimals. Convert between mixed numbers and improper fractions. Use all four operations on fractions including mixed numbers. Use and interpret fractions leading to terminating or recurring decimals. Use reciprocal on fractions decimals and integers. Rich task – Fractions, Decimals, Percentages, Ratio, and use of a calculator	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Work with improper fractions and mixed numbers, eg divide 5 pizzas between 3 people. Express a given number as a fraction of another, including where the fraction is, for example, greater than 1, e.g. $\frac{120}{100} = 1\frac{2}{10} = 1\frac{1}{5}$. Prove whether a fraction is terminating or recurring. Convert a fraction to a decimal including where the fraction is greater than 1.	Use of key words: Decimal, percentage, inverse, addition, subtraction, multiplication, division, fractions, mixed, improper, recurring, integer, decimal, terminating, reciprocal.	Within 2nd assessment early Spring Term	Use of manipulatives and non-examples to concrete knowledge and understanding. Regular recall strategies every lesson.
	Unit 4b Percentages. (8 hours)	Convert between fractions, decimals and percentages. Express numbers as percentages of others including greater than 100%. Find percentages of amounts, percentage increases and decreases including the use of calculator and a multiplier. Find percentage change and original percentages. Use percentage in real life and compare to fractions. Use fractions within solutions as a more accurate answer than a rounded decimal.	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Using a mixture of calculator and non-calculator methods for percentages. Investigate comparisons between simple and compound interest calculations. Use a multiplier to increase or decrease by a percentage. Understand that fractions are more accurate in calculations than rounded percentage or decimal equivalents, and choose fractions, decimals or percentages appropriately for calculations. Use calculators for reverse percentage calculations by doing an appropriate division.	Use of **key words**: Decimal, percentage, inverse, addition, subtraction, multiplication, division, fractions, mixed, improper, recurring, integer, decimal, terminating, percentage, VAT, increase, decrease, multiplier, profit, loss Number fluency through easily converting between fractions, decimals and percentages is a useful skill in making more complex topics easier to understand, especially in problem solving contexts, which is essential in helping students make informed decisions in life.	Within 2nd assessment early Spring Term	Use of manipulatives and non-examples to concrete knowledge and understanding. Regular recall strategies every lesson.

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Spring term 2	Unit 4c Ratio & Proportion (10 hours)	Express the division of a quantity as a ratio, use unitary ratio and simplify ratios. Divide a quantity into a given ratio. Write ratio as a fraction. Use direct proportion as a result of ratio. Use conversion of currency and recipes through a ratio.	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Solve word problems about ratio and proportion. Use a ratio to compare a scale model to real-life objects. Use a ratio to convert between measures and currencies, e.g. £1.00 = €1.36. Scale up recipes.	Choosing the most appropriate method in solving problems results in increased confidence and many of these skills are transferrable to real-life situations, and therefore helping the students become reflective, responsible and insightful individuals	Within 1st assessment end of October/ early November	Use of manipulatives and non-examples to concrete knowledge and understanding. Regular recall strategies every lesson.
	Unit 3a Averages and Range. (8 hours)	Design, complete and interpret two way tables. Use quantitative and qualitative data. Find the mean, median, mode and range of small data sets. Construct and interpret stem and leaf diagrams including identifying averages and spread. Find averages and spread of data from frequency tables including both discrete and grouped data.	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Be able to state the median, mode, mean and range from a small data set. Extract the averages from a stem and leaf diagram. Estimate the mean from a table. Given the mean, median and mode of five positive whole numbers, can you find the numbers?	Use of **key words**: Mean, median, mode, range, average, discrete, continuous, qualitative, quantitative, data, scatter graph, line of best fit, correlation, positive, negative, sample, population, stem and leaf, frequency, table, sort, pie chart, estimate	Within 3rd assessment Start of summer term	Use of manipulatives and non-examples to concrete knowledge and understanding. Regular recall strategies every lesson.
Summer term 1	Unit 3b Representing & Interpreting Data. (10 hours)	Know which charts and graphs to use for differing data sets. Construct and interpret bar, line, and pie charts. Construct a frequency polygon and interpret a range of data from it. Use histograms with equal width bars. Use a time series graph and interpret what it represents. Compare averages and spread of two data sets looking for simple patterns and relationships. .	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Use a time–series data graph to make a prediction about a future value. Explain why same-size sectors on pie charts with different data sets do not represent the same number of items, but do represent the same proportion. Make comparisons between two data sets. Evaluate statements in relation to data displayed in a graph/chart.	These statistics based topics provide opportunities for students to work together and allows for discussion and debate on the use and abuse of statistics in the media and how data is best presented to eliminate bias	Within 3rd assessment Start of summer term	Use of real life data for students. Hands on approach and discovery of rules Use of manipulatives and non-examples to concrete knowledge and understanding.

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	Unit 3c Scatter Graphs (4 hours)	Construct and interpret scatter diagrams. Use lines of best fit including making predictions from it, and identify outliers. Understand types of correlation and their meaning as a relationship of data	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Identify outliers and explain why they may occur. Given two sets of data in a table, model the relationship and make predictions. Use the line of best fit make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing		Within 3rd assessment Start of summer term	Use of real life data and non-examples.
	Unit 5a Angles in Parallel Lines. (8 hours)	Alternate and Corresponding angles, Interior and exterior angles. Solve problems including simple proof of angles in shapes including the use of parallel lines.	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Justify clearly missing angles on diagrams using the various rules of angles in parallel lines, linking with prior knowledge of angle facts. Solve problems that involve a clear chain of reasoning and provide counter-arguments to statements. Find and give reasons for missing angles on diagrams using:	Use of **key words**: Alternate, Allied, Co-interior, supplementary, Corresponding, parallel, perpendicular, triangle, isosceles, regular.	Within 3rd assessment Start of summer term	Use of manipulatives and non-examples to concrete knowledge and understanding. Use of mnemonics (for example FUN) Regular recall strategies every lesson.
Summer term 2	Unit 5c Polygons, Angles 94 hours)	Classify the properties of types of triangles and quadrilaterals. Use regular and irregular shapes in calculations. Know angles facts to include angle sum of triangles and other polygons,	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Name all quadrilaterals that have a specific property. Use geometric reasoning to answer problems giving detailed reasons. Find the size of missing angles at a point or at a point on a straight line. Geometrical problems involving algebra. Use angle facts to demonstrate how shapes would 'fit together', and work out interior angles of shapes in a pattern. Given the size of its exterior angle, how many sides does the polygon have?	Use of **key words**: Quadrilateral, angle, polygon, interior, exterior, proof, tessellation, rotational symmetry, parallel, corresponding, alternate, co-interior, vertices, edge, face, sides, triangle, perpendicular, isosceles, scalene, clockwise, anticlockwise, hexagons, heptagons, octagons, decagons, obtuse, acute, reflex, quadrilateral, triangle, regular, irregular, two-dimensional, three-dimensional, measure, line, angle, order, intersecting	Within 3rd assessment Start of summer term	Use of manipulatives and non-examples to concrete knowledge and understanding. Regular recall strategies every lesson.
	Unit 5b Pythagoras' Theorem & Trigonometry . (10 hours)	Use and recall Pythagoras' theorem in 2D, including proving a triangle has a right angle. Find the length of a line segment between two points. Leave solutions in surd form Use and recall rules of Trigonometry to solve 2D problems involving finding a side or angle. Use angle of elevation or depression. Know exact values without a calculator	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Give an answer to the use of Pythagoras' Theorem in surd form. Understand, use and recall the trigonometric ratios sine, cosine and tan, and apply them to find angles and lengths in general triangles in 2D figures. Use the trigonometric ratios to solve 2D problems. Find angles of elevation and depression. Know the exact values of sin θ and cos θ for θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60°.	Use of key words: Triangle, right angle, angle, Pythagoras' Theorem, sine, cosine, tan, trigonometry, opposite, hypotenuse, adjacent, ratio, elevation, depression, length, accuracy	Within 2nd assessment early Spring Term	Use of manipulatives and non-examples to concrete knowledge and understanding. Regular recall strategies every lesson.

		of some Trigonometric values.					
	Unt 8b Construction, loci and bearings	Identify congruence within shapes. Construct triangles and know rules regarding similarity on sides and angles. Construct perpendicular bisector including from a point, bisect an angle, construct angles 90 and 45 degrees. Identify and construct regions given a set of rules, and identify locus. Use scales and scale diagrams including map use. Use 3 figure bearings to and from points. Draw accurate bearings diagrams.	Knowledge acquisition will be developed through the building of prior knowledge, revisiting skills covered, and through regular quick fire assessments throughout the term.	Sketch the locus of point on a vertex of a rotating shape as it moves along a line, i.e. a point on the circumference or at the centre of a wheel. Given the bearing of a point *A* from point *B*, work out the bearing of *B* from *A*. Use accurate drawing to solve bearings problems; Solve locus problems including bearings.	Use of **key words:** Construct, circle, arc, sector, face, edge, vertex, two-dimensional, three-dimensional, solid, elevations, congruent, angles, regular, irregular, bearing, degree, bisect, perpendicular, loci, map, scale, plan, region	End of year assessment	Visual aids, kinaesthetic learning (students walking the loci). Use of manipulatives, e.g. solid shapes for students to hold.