Mathematics Year 10		***Curriculum Checkpoints: What do students know and what can they do?***				***MW Clips***	Further guidance
Summative Comment		**Developing**	**Securing**	**Mastering**	**Excelling**		
AF1	**Congruency, Similarity and Enlargement**	Enlarging shapes by a positive scale factor, understanding how to increase the size of a shape while maintaining its proportional dimensions.integer indices	Enlarging shapes by a negative scale factor, understanding how to decrease the size of a shape while maintaining its proportional dimensions.	Enlarging shapes by a fractional scale factor, understanding how to resize a shape by a fraction while preserving its proportional dimensions.	Understanding the difference between congruence and similarity, distinguishing between two geometric concepts and recognising their unique properties.	172 173 174 181a 181b 202a 202b	Similarity and Congruence
		Identifying similar shapes, recognising shapes that have the same shape but may differ in size.	Using parallel line rules to determine missing angles, understanding the properties and relationships between angles formed by parallel lines and a transversal.	Exploring the areas and volumes of similar shapes, understanding the relationship between the scale factor and the ratios of areas and volumes in similar figures.	Proving that a pair of triangles are congruent, using mathematical reasoning and geometric principles to demonstrate that two triangles are identical in shape and size.		
AF2	**Trigonometry**	Using the sine, cosine, and tangent ratios to find missing side lengths in right-angled triangles, understanding how to apply these trigonometric functions to solve basic trigonometric problems.	Calculating side lengths in right-angled triangles using Pythagoras' Theorem, understanding the relationship between the lengths of the two shorter sides and the length of the hypotenuse in a right-angled triangle.	Using trigonometry in three-dimensional shapes, applying trigonometric principles and techniques to solve problems involving angles, side lengths, and surface areas of three-dimensional objects.	Applying advanced techniques and strategies to solve complex problems involving trigonometry in three-dimensional shapes, including more intricate scenarios and non-standard shapes.	168 169 195a 195b 196a 196b 218	Trigonometry
		Using the sine, cosine, and tangent ratios to find missing angles in right-angled triangles, understanding how to apply these trigonometric functions to determine unknown angles.	Selecting the appropriate method to solve right-angled triangle problems, applying critical thinking skills to determine the most suitable trigonometric method or theorem for solving a given problem.	Choosing and using the sine and cosine rules, understanding when and how to apply these rules to solve problems involving non-right-angled triangles, including calculating side lengths and angles.	Applying advanced trigonometric concepts and reasoning to solve challenging problems, including situations where multiple triangles or trigonometric identities are involved.		
AF3	**d Inequalities**	Forming and solving one-step and two-step equations and inequalities, understanding the steps and methods for solving simple equations and inequalities involving arithmetic operations.	Representing solutions to inequalities using set notation, understanding how to express the solution set of an inequality using set notation symbols and interval notation.	Finding solutions to equations using straight line graphs and applying the knowledge of graphing straight lines to identify points of intersection between a graph and an equation.	Forming and solving equations with unknowns on both sides and applying algebraic techniques to simplify and solve equations involving variables on both sides of the equation.	135a 135b 136 137 156	Equations and

AF3	Equations an	Showing solutions to inequalities on a number line and understanding how to represent the solution set of an inequality visually using a number line.	Drawing straight line graphs and understanding the relationship between the equation of a straight line and its graphical representation on a coordinate plane.	Representing solutions to multiple inequalities on a graph and understanding how to graph and interpret the solution set of a system of inequalities on a coordinate plane.	Forming and solving more complex equations and inequalities and applying advanced algebraic techniques to solve equations and inequalities involving multiple variables, exponents, or higher-order polynomials.	191 192 209a 209b 209c	Inequalities
AF4	Simultaneous Equations	Solving a pair of linear simultaneous equations by adjusting one equation, understanding how to modify one equation to eliminate a variable and find the solution.	Forming and solving a pair of linear simultaneous equations from given information, understanding how to create a system of equations that represents a given situation and finding the solution.	Solving a pair of simultaneous equations (one linear, one quadratic) using graphs, understanding how to plot the graphs of both equations and identify the points of intersection as the solution.	Applying advanced techniques and strategies to solve more complex simultaneous equation problems involving linear and quadratic equations, including cases where multiple solutions or special conditions exist.	140 141 165c 166 212	Simultaneous equations
		Solving a pair of linear simultaneous equations by adjusting both equations, understanding how to modify both equations to eliminate variables and find the solution.	Determining whether a given (x, y) coordinate is a solution to both a linear and quadratic equation, understanding how to substitute the coordinate values into the equations and check for equality.	Solving simultaneous equations involving a third unknown, understanding how to create a system of equations with three variables and solve for the unknowns using various methods.	Applying advanced graphical methods and mathematical reasoning to solve simultaneous equation problems involving linear and quadratic equations, analysing the graphs and accurately identifying the intersection points.		
AF5	Angles and bearings	Drawing and interpreting scale diagrams, understanding how to represent objects or spaces accurately in a scaled-down format and interpret measurements and proportions.	Calculating bearings using angle rules, understanding how to use the properties of angles and angles in a triangle to determine compass bearings.	Solving bearings problems using the sine and cosine rules, understanding how to apply these trigonometric rules to find missing sides or angles in more complex bearings problems.	Investigating and exploring advanced topics related to scale diagrams, bearings, and trigonometry, including advanced applications and complex problem-solving scenarios.	45 46a 46b 47 121	Angles and Bearings
		Making scale drawings using bearings, understanding how to use compass directions and angles to create accurate scale drawings.	Solving bearings problems using Pythagoras' theorem and trigonometry, applying these principles to calculate distances, heights, or lengths in bearings problems.	Applying advanced techniques and strategies to solve challenging bearings problems, including scenarios that involve multiple angles, bearings, or trigonometric calculations.	Applying advanced mathematical reasoning and critical thinking skills to solve intricate bearings problems, including scenarios with non-standard shapes, irregular measurements, or real-world contexts.		

AF6	Working with Circles	Recognising and labelling parts of a circle, understanding the different components of a circle such as radius, diameter, chord, and circumference.	Calculating the area of a sector, understanding how to determine the portion of a circle enclosed by an arc and its corresponding central angle.	Understanding and using the volume of a cylinder, cone, and sphere, comprehending the formulas and principles for calculating the volume of these three-dimensional shapes.	Solving area and volume problems involving similar shapes, applying the concepts of similarity and proportionality to determine the relationships between the areas and volumes of similar shapes.	116 117 118 119 183 184	Working with Circles
		Calculating the length of an arc, understanding how to measure the curved length along a circle's circumference.	Understanding circle theorems, including angles at the centre and circumference, angles in a semi-circle, angles in the same segment, and angles in a cyclic quadrilateral.	Understanding and using the surface area of a cylinder, cone, and sphere, comprehending the formulas and principles for calculating the surface area of these three-dimensional shapes.			
AF7	Vectors	Understand, use, and read vector notation, which is a way of writing and understanding vectors using symbols and mathematical language.	Explore how vectors can be used to describe movements and transformations in shapes, such as how they can show how an object moves or changes position.	Use vectors to find out if points lie on the same line, helping to determine if they are in a straight line or not.	Take part in advanced investigations and applications of vectors in geometry, exploring complex concepts and how they relate to shapes and transformations.	174	Vectors
		Draw and understand adding and subtracting vectors, which involves combining or taking away vectors to understand their overall effect.	Understand parallel vectors, which are vectors that have the same direction or follow the same path.	Use vectors to create logical arguments and proofs in geometry, using vector properties and reasoning to explain and prove geometric concepts.	Apply advanced vector techniques to solve intricate geometry problems, including problems involving vectors in higher-dimensional spaces or non-Euclidean geometries.		
AF8	fractions	Compare quantities using a ratio, understanding how to compare different quantities by expressing their relationship in ratio form.	Use ratios and fractions to make comparisons, applying ratios and fractions to compare quantities and determine relative sizes.	Use and interpret ratios of the form 1 : n and n : 1, understanding the meaning and application of ratios where one part is fixed or variable.	Combine a set of ratios, understanding how to manipulate and combine ratios in complex scenarios involving multiple quantities and relationships.	37a 37b 38 70 131	Ratio and

	Ratio and	Share in a ratio (given total or one part), understanding how to divide a quantity into parts according to a given ratio.	Solve problems with currency conversion, understanding how to convert between different currencies using ratios and exchange rates.	Solve best buy problems, applying ratios to determine the most cost-effective option among multiple choices.	Apply ratios in area and volume problems, utilizing ratios to solve problems involving the comparison of areas and volumes of shapes or objects.	131 166 200a 200b 200c	fractions
AF9	Percentages and interest	Learn how to convert between fractions, decimals, and percentages and understand how to compare their values.	Develop the ability to increase or decrease values by a given percentage, understanding how to apply this in real-life situations.	Explore the concepts of simple and compound interest, understanding how interest rates and compounding affect the growth of investments or debts.	Learn to reverse percentage changes and find the original value given the final value and the percentage change.	90 91 92 109 110 111 112	Percentage and interest
		Practice calculating percentages of given amounts using mental methods and calculators.	Learn how to express one number as a percentage of another, finding percentages in different contexts	Solve problems that involve multiple percentage changes, such as finding the overall change after a series of increases or decreases.	Apply mathematical concepts of growth and decay to solve real-world problems, such as population growth or radioactive decay.		
AF10	Probability	Learn the basic operations of adding, subtracting, and multiplying fractions, understanding their meaning and applying them in simple contexts.	Understand that the probabilities of all possible outcomes of an event add up to 1, and use this property to solve probability problems.	Create sample spaces for situations involving multiple events, such as tossing multiple coins or drawing cards from a deck.	Build tree diagrams to represent and calculate conditional probabilities, understanding how to adjust probabilities based on given conditions.	59 60 61 125 126 185	Probability
		Calculate probabilities when all outcomes are equally likely, such as flipping a fair coin or rolling a fair die.		Calculate probabilities for independent events and represent them using tree diagrams, understanding how to combine probabilities using multiplication.	Use Venn diagrams and two-way tables to represent and analyze conditional probabilities, exploring different ways of presenting and interpreting the data.		

AF11	Data Handling	Learn about the various types of data, such as numerical and categorical data, and understand the methods used to collect data.	Construct and interpret two-way tables to explore relationships between two variables, providing insights into the connections within the data.	Construct cumulative frequency diagrams to examine the distribution of data, identify percentiles, and make comparisons across different datasets.	Construct and interpret box plots to analyse the spread, median, and outliers in data, providing a deeper understanding of the distribution characteristics.	57 58 63 64 65 128a 128b	Data handling
		Construct frequency tables to organise data and interpret the frequencies, gaining a basic understanding of data distribution.	Calculate and interpret measures of central tendency, including mean, median, and mode, to summarise and compare data sets effectively.	Construct histograms to visualise and analyse the distribution of numerical data, exploring patterns and identifying key features.	Construct histograms to visualise and analyse the distribution of numerical data, exploring patterns and identifying key features.		
AF12	Non calculator methods	Understand and apply the four rules of decimal/integer arithmetic: Learn and use addition, subtraction, multiplication, and division with decimals and integers to solve basic arithmetic problems.	Learn the principles of rounding numbers to a specified number of decimal places or significant figures to provide appropriate levels of precision.	Develop the ability to work with exact values and expressions, avoiding rounding or approximation unless explicitly required.	Learn about surds (square roots of non-perfect squares) and develop the ability to perform calculations involving surds.	3, 4, 15, 19, 20, 21, 24, 29, 30, 31, 32, 38, 52, 55, 56, 61, 71a, 71b, 73, 74, 75, 76, 77, 83, 84, 85, 92, 102,	Non Calculator methods
		Learn and use addition, subtraction, multiplication, and division with fractions to solve basic arithmetic problems.	Develop the skill of estimating solutions to calculations, using approximations to provide quick and reasonable estimates.	Gain an understanding of rational numbers (those that can be expressed as fractions) and irrational numbers (those that cannot be expressed as fractions).	Explore the concept of upper and lower bounds in calculations and use them to provide a range of possible values that contain the true result.		
AF13	r and sequences	Understanding factors and multiples: Learn the difference between factors and multiples, which are numbers that divide evenly into another number and numbers obtained by multiplying a given number by whole numbers, respectively.	Explore and explain the patterns in arithmetic and geometric sequences, understanding the constant difference in arithmetic sequences and the constant ratio in geometric sequences.	Exploring different sequence types and their patterns: Investigate various types of sequences, such as Fibonacci sequences, triangular numbers, and square numbers, to identify their unique patterns and characteristics.	Determining the nth term formula for quadratic sequences: Gain proficiency in finding the formula or rule to calculate the nth term of quadratic sequences by understanding the consistent second difference between consecutive terms.	2, 28, 28, 29, 30, 31, 32, 33, 34, 81, 82, 83, 105, 106,	Types of number and

AF13	Types of numbe	Develop the ability to calculate the Highest Common Factor (HCF) and Lowest Common Multiple (LCM) of a set of numbers, helping in problem-solving related to factors and multiples.	Learn to find the formula or rule that helps calculate the nth term of a linear sequence by recognizing the consistent difference between consecutive terms.	Expressing numbers as products of prime factors and understanding prime numbers: Master prime factorisation skills, expressing numbers as a product of their prime factors, and gaining a deep understanding of the properties and significance of prime numbers.	Enhance skills in working with surds and understanding their patterns and relationships within sequences.	108, 123, 124, 129, 132, 138, 139, 143.	Number and sequences
AF14	Indices and roots	Understand and recognise the concept of square and cube numbers, identifying examples and their characteristics.	Calculate higher powers of numbers and determine roots, extending beyond squares and cubes.	Demonstrate proficiency in working with powers of powers, solving complex problems involving multiple layers of exponentiation.	Excel in performing advanced calculations with numbers expressed in standard form, including addition, subtraction, multiplication, and division.	29 30 31 33 34 81 82 83 129 132	Indices and roots
		Explore the concept of powers of ten and practise expressing numbers in standard form.	Apply the rules for adding and subtracting indices (exponents) with the same base, enhancing skills in simplifying and manipulating expressions.	Apply fractional indices (exponents) to calculate roots of numbers, extending beyond squares and cubes and understanding the principles behind fractional exponents.	Develop a deep understanding of the properties and applications of indices, including the exploration of negative indices and fractional exponents in mathematical operations.		
AF15	Manipulating Expressions	Learn to simplify algebraic expressions, including combining like terms and applying basic algebraic operations.	Add and subtract algebraic fractions, using the concept of finding a common denominator and simplifying the result.	Formulate and solve equations and inequalities involving fractions, including equations and inequalities with fractional coefficients.	Demonstrate advanced skills in simplifying and manipulating complex algebraic expressions, including those with multiple variables and exponents.	24 25 26 135a 135b 136 137 155 191 192	
		Apply algebraic identities to simplify expressions and solve simple equations.	Multiply and divide algebraic fractions, understanding the rules for multiplying and dividing fractions and simplifying the resulting expressions.	Solve equations with algebraic fractions, employing techniques such as clearing fractions, factoring, and isolating variables to find solutions.	Solve challenging equations and inequalities with algebraic fractions, involving higher-degree equations and inequalities, and applying advanced methods such as partial fraction decomposition or substitution techniques.		