Mathematics Year 8		***Curriculum Checkpoints: What do students know and what can they do?***				***MW Clips (KS3)***	Knowledge Organiser
Summative Comment		**Developing**	**Securing**	**Mastering**	**Excelling**		
AF1	**Ratio and Scale**	Understanding and using ratio notation to represent relationships between quantities.	Dividing quantities in a given ratio, understanding how to distribute quantities according to a given ratio.	Comparing ratios and fractions, understanding their similarities and differences, and recognising equivalent ratios and fractions.	Understanding gradient as a ratio, recognising its role in representing the steepness or slope of a line.	R1a	Ratio and Scale
		Solving problems involving ratios of the form m:n and 1:n, where m and n are integers.	Expressing ratios in their simplest integer form by dividing both parts by their greatest common divisor.	Understanding pi (π) as a ratio, recognising its relationship to the circumference and diameter of a circle.	Expressing ratios in the form 1:n, understanding the significance of the ratio of one part to the total quantity.		
AF2	**Multiplicative Change**	Solving problems involving direct proportion, understanding how two quantities vary in relation to each other.	Exploring and understanding relationships between similar shapes, including identifying corresponding sides and angles in similar figures.	Applying advanced techniques to solve problems involving graphs of direct proportion, such as finding unknown values or determining the constant of proportionality.	Applying advanced mathematical reasoning to solve complex problems involving direct proportion, including non-linear or multi-variable scenarios.	N31b	Multiplicative change
		Exploring conversion graphs to understand and interpret relationships between different units of measurement.	Interpreting maps using scale factors and ratios to determine distances and proportions on a map.	Analysing and interpreting graphs of direct proportion, understanding how changes in one quantity affect the other and identifying key characteristics of the graphs.	advanced concepts related to graphs of direct proportion, such as rates of change, asymptotes, or proportional relationships in real-world contexts.		

AF3	Multiply and divide fractions	Finding the product of a pair of fractions, understanding how to multiply the numerators and denominators.	Dividing any pair of fractions, understanding how to multiply the first fraction by the reciprocal of the second fraction.	Multiplying and dividing algebraic fractions, understanding how to perform the operations with fractions containing variables.	Applying algebraic manipulation to simplify and solve complex algebraic fraction equations.	N34	Multiplying & Dividing fractions
		Understanding and using the reciprocal, recognizing that it is the multiplicative inverse of a fraction.	Multiplying and dividing improper and mixed fractions, converting mixed fractions to improper fractions and performing the operations.	Applying advanced techniques to simplify and solve complex algebraic fractions.	Applying advanced strategies and mathematical reasoning to solve intricate problems involving the multiplication and division of fractions, including multiple steps and mixed types of fractions.		
AF4	Working in the cartesian plane	Recognising and using lines of the form y=kx, understanding that these lines represent direct proportion relationships between variables.	Recognising and using lines of the form y=x+a, understanding that these lines have a constant positive or negative intercept on the y-axis.	Exploring non-linear graphs, understanding that not all graphs can be represented by straight lines and recognising the characteristics of non-linear graphs.	Exploring the gradient of the line y=kx, understanding how the value of k affects the slope and steepness of the line.	A1a A1b	Working in the cartesian plane
		Linking the equation y=kx to direct proportion problems, understanding how to apply the equation to solve problems involving proportional relationships.	Plotting graphs of the form y=mx+c, understanding the role of the slope (m) and the y-intercept (c) in determining the characteristics of the graph.	Finding the midpoint of a line segment, understanding how to calculate the coordinates of the point that divides the line segment into two equal parts.	Applying advanced techniques and mathematical reasoning to analyse and interpret graphs, including identifying key features and understanding the relationship between equations and their graphical		
AF5	ata / Tables and omes	Drawing and interpreting scatter graphs, understanding how to plot data points and identify trends or patterns.	Reading and interpreting grouped and ungrouped frequency tables, understanding how to identify the frequency and distribution of data.	Constructing, interpreting, and finding probabilities from two-way tables, understanding how to analyze and calculate probabilities based on categorical data.	Applying the product rule for finding the total number of possible outcomes, understanding how to calculate probabilities for events involving multiple independent factors.	S1a S1b	Representing Data

AF5	Representing D outco	Discussing correlations between variables in scatter graphs and using a line of best fit to estimate the relationship between variables.	Representing continuous data by grouping it into equal classes, understanding how to create intervals and represent data in a grouped format.	Finding probabilities from Venn diagrams, understanding how to use overlapping regions to determine the probability of events.	Applying advanced probability concepts and techniques to solve complex problems, including conditional probability, permutations, and combinations.	S2a S2b	Tables and Probability
AF6	Brackets, Equations and Inequalities	Multiplying out and factorising expressions into a single bracket, understanding the distributive property and techniques for factoring.	Expanding a pair of binomials, understanding the FOIL method and applying it to multiply binomial expressions.	Forming and solving inequalities, understanding how to set up and manipulate inequalities to find solutions.	Identifying and using formulae, expressions, identities, and equations in advanced problem-solving contexts, applying mathematical reasoning to select and manipulate appropriate formulas.	A8 A10 A12 R4 R8	Brackets, Equations and Inequalities
		Expanding multiple single brackets and simplifying expressions by combining like terms.	Forming and solving equations with brackets, understanding how to set up equations based on given information and simplifying expressions to find solutions.	Forming and solving equations and inequalities with unknowns on both sides, understanding the steps and techniques to isolate the variable and determine the solution.	Applying advanced techniques and strategies to solve complex equations and inequalities, including manipulating expressions, applying inverse operations, and interpreting the solutions in the context of the		
AF7	Sequences	Generating sequences given a rule described in words, understanding how to follow verbal instructions to create a sequence of numbers.	Generating sequences given a complex algebraic rule, understanding how to apply advanced mathematical operations or formulas to create a sequence.	Applying advanced techniques and mathematical reasoning to generate sequences with complex rules involving variables or powers.	Applying advanced mathematical concepts and techniques to generate sequences with non-linear or recursive rules.	A11a A11b A11c	Sequences
		Generating sequences given a simple algebraic rule, understanding how to use basic mathematical operations to generate a sequence.	Finding the rule for the nth term of a linear sequence, understanding how to identify the pattern or relationship between the terms and express it algebraically.	Investigating and analysing linear sequences to determine the rule for the nth term, understanding how to generalise the pattern and express it using algebraic notation.	Applying advanced algebraic reasoning to derive and prove the rule for the nth term of complex sequences, including quadratic, powerial, or geometric sequences.		

AF8	Indices	Adding and subtracting expressions with indices, understanding how to combine terms with the same base and power.	Simplifying algebraic expressions by dividing indices, applying the rules for dividing terms with the same base.	Using the addition and subtraction laws for indices, applying the rules to simplify expressions with terms of different bases and powers.	Applying advanced techniques and mathematical reasoning to simplify complex expressions with indices, including expressions with multiple	N25	Indices
		Simplifying algebraic expressions by multiplying indices, applying the rules for multiplying terms with the same base.	Using the addition law for indices, understanding how to add terms with the same base and different powers.	Exploring powers of powers, understanding the rules and patterns for simplifying expressions with nested or cascading powers.	Exploring and applying advanced concepts related to powers of powers, such as fractional or negative powers, and investigating their properties		
AF9	Fractions and percentages	Converting between key fractions, decimals, and percentages fluently, understanding the relationship between these forms and being able to convert easily.	Calculating percentage increase and decrease using a multiplier, understanding how to apply the multiplier to calculate the changed amount.	Finding the original amount given the percentage, understanding how to work backwards from a changed amount to find the original value.	Applying advanced techniques and strategies to solve complex percentage problems, including problems with multiple variables, compound interest, or non-linear relationships.	N32 N33 N39a N39b	Fractions and Percentages
		Calculating fractions, decimals, and percentages of an amount, understanding how to find a given fraction, decimal, or percentage of a given quantity.	Working with percentage change, understanding how to calculate the percentage change between two values and interpret the direction of change.	Choosing appropriate methods to solve complex percentage problems, applying critical thinking and problem-solving skills to select the most suitable approach for solving a given problem.	Applying mathematical reasoning and critical thinking to analyse and interpret complex percentage problems, evaluating different approaches and selecting the most appropriate method for solving the problem.		
AF10	Standard Form	Working with numbers greater than 1 in standard form, understanding how to convert numbers to standard form and perform basic operations such as addition and subtraction.	Comparing and ordering numbers in standard form, understanding how to compare the magnitude of numbers and arrange them in ascending or descending order.	Working with numbers between 0 and 1 in standard form, understanding how to perform more complex operations such as poweriation and calculating roots.	Applying advanced techniques and strategies to solve complex problems involving numbers in standard form, such as scientific notation and significant figures.	N32 N33 N39a N39b	Standard Form
		Working with numbers between 0 and 1 in standard form, understanding how to convert numbers to standard form and perform basic operations such as multiplication and division.	Performing the four operations (addition, subtraction, multiplication, and division) with numbers in standard form, understanding the rules and techniques for carrying out	Understanding and using negative and fractional indices, understanding how to apply negative powers and fractional powers to numbers in standard form.	Applying mathematical reasoning and critical thinking to analyse and interpret numerical expressions involving standard form and negative/fractional indices, and applying them to		

AF11	Number Sense	Rounding numbers to a given number of decimal places and significant figures, understanding the rules and methods for rounding numbers accurately.	Understanding and using error interval notation, recognising its importance in representing the range of possible values for a measurement or calculation.	Calculating with money, understanding how to perform calculations involving currency, such as addition, subtraction, multiplication, and division.	Converting metric units of area and volume, understanding the formulas and conversion factors for converting between different metric units of area and volume.	N10 N11	Number Sense
		Estimating the answer to a calculation, using approximation techniques to find an approximate value without performing detailed calculations.	Performing calculations using the order of operations, understanding the rules and conventions for carrying out calculations involving multiple operations.	Converting metric measurements of lengths, weight, and capacity, understanding the relationships and conversion factors between different metric units.	Solving problems involving time and the calendar, applying mathematical concepts and reasoning to solve problems related to time, dates, and scheduling.		
AF12	Angles in parallel lines	Recognising and calculating co-interior, alternate, and corresponding angles, understanding their properties and relationships.	Identifying and calculating the sides and angles in special quadrilaterals, understanding the specific properties and relationships associated with each type of special quadrilateral.	Understanding and using the sum of interior and exterior angles in any polygon, recognising the relationships and formulas for calculating the total angle measures in polygons.	Constructing a perpendicular bisector of a line segment and angle, understanding the steps and methods for constructing a line that is perpendicular to a given line segment or angle.	G18	Angles in parallel lines
		Constructing triangles and special quadrilaterals, understanding the steps and methods involved in creating these specific geometric shapes.	Understanding and using the properties of diagonals in quadrilaterals, recognising the patterns and characteristics related to the diagonals of different quadrilaterals.	Proving simple geometric facts, applying logical reasoning and mathematical principles to demonstrate the truth of geometric statements and theorems.	Applying advanced techniques and reasoning to prove more complex geometric facts, including intricate theorems and geometric properties.		
AF1	ium & circles	Calculating the area of triangles, rectangles, trapeziums, and parallelograms, understanding the formulas and methods for finding their areas.	Calculating the area of a circle and parts of a circle, understanding the formulas and concepts related to the circumference, radius, diameter, and area of a circle.	Applying advanced techniques and concepts to calculate the area of irregular shapes, including using approximation methods or breaking the shape into simpler components.	Investigating and exploring advanced topics related to the area of polygons and circles, such as theorems, proofs, or specialised formulas.	G20d	Area of

AF13	Area of a trapez	Calculating the perimeter and area of compound shapes, understanding how to break down complex shapes into simpler components and find their individual perimeters and areas.	Applying the formulas and techniques to find the area of circles and various parts of circles, such as sectors and segments.	Applying the formulas and techniques to solve complex problems involving the area of circles and compound shapes, including real-life applications and multi-step calculations.	Applying advanced mathematical reasoning and critical thinking skills to solve intricate problems involving the area of complex shapes, including composite figures or shapes with curved boundaries.	G22a G22b	Trapezia and Circles
AF14	Line Symmetry and reflection	Reflecting a shape in a horizontal or vertical line, understanding how to create the mirror image of a shape by flipping it across a horizontal or vertical axis.	Applying the principles of reflection to accurately reflect shapes in horizontal or vertical lines, understanding the concept of symmetry and how it relates to reflections.	Exploring and manipulating complex shapes to accurately reflect them in horizontal or vertical lines, recognising the patterns and relationships that arise from different reflection scenarios.	Applying advanced techniques and strategies to reflect shapes in specific orientations or across multiple axes, analysing the effects of reflections on shapes and identifying any resulting patterns or symmetries.	G3 G4a G4b	Line symmetry and reflection
		Reflecting a shape in a diagonal line, understanding how to create the mirror image of a shape by flipping it across a diagonal line.	Applying the principles of reflection to accurately reflect shapes in diagonal lines, understanding the properties and characteristics of diagonal reflections.	Exploring and manipulating complex shapes to accurately reflect them in diagonal lines, understanding the geometric principles involved in diagonal reflections.	Investigating and applying mathematical reasoning to explore the properties and characteristics of reflected shapes, including the relationships between the original shape and its reflected image.		

AF15	Data Handling & Averages	Planning and conducting a statistical investigation, understanding the steps involved in setting up a statistical enquiry, including defining objectives, selecting data sources, and determining appropriate data collection methods.	Drawing and interpreting pictograms, bar charts, and vertical line charts, understanding how to represent and interpret categorical data using these graphical representations.	Representing and interpreting grouped quantitative data, understanding how to organise and display data in frequency tables, histograms, and box plots, and interpreting the characteristics of these graphical representations.	Identifying misleading graphs, applying critical thinking skills to recognise and analyse graphical representations that may distort or misrepresent data, identifying sources of bias or manipulation.	S4 S5 S6 S7	Line symmetry and reflection
		Designing and evaluating questionnaires, understanding the principles of effective questionnaire design, including formulating clear and unbiased questions, selecting appropriate response options, and considering the target audience.	Drawing and interpreting bar charts, pie charts, and line graphs, understanding how to represent and interpret data using these graphical representations, including numerical and proportional relationships.	Comparing distributions using charts, understanding how to compare and contrast different data distributions using graphical representations, identifying similarities, differences, and trends.	Applying advanced statistical techniques and reasoning to analyse and interpret data, including advanced graphing techniques, inferential statistics, and advanced data visualization methods.		Measures of location (Averages and Spread)