Marden Bridge Middle School

Empowering Minds   Inspiring Futures

Curriculum Outline 2023-24: **Maths**

[This document summarises the content to be delivered over the course of the year. There will be some rotation of topics due to resourcing implications]

Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 5	**Place Value** -Numbers up to 1,000,000 -Read and write numbers to 1,000,000 -Powers of 10 -10/100/1,000/10,000/100,000 more or less -Partition numbers to 1,000,000 -Number line to 1,000,000 -Compare and order numbers up to 1,000,000 -Round to the nearest 10, 100 or 1,000 -Round within 100,000 -Round within 1,000,000 **Addition and Subtraction** -Mental strategies -Add whole numbers with more than four digits -Subtract whole numbers with more than four digits -Round to check answers	**Multiplication and Division** -Multiples and common multiples -Factors and common factors -Prime numbers -Square numbers -Cube numbers -Multiply by 10, 100 and 1,000 -Divide by 10, 100 and 1,000 -Multiples of 10, 100 and 1,000 **Fractions** -Find fractions equivalent to a unit fraction -Find fractions equivalent to a non-unit fraction -Recognise equivalent fractions -Convert improper fractions to mixed numbers -Convert mixed numbers to improper fractions -Compare fractions less than 1 -Order fractions less than 1 -Compare and order fractions greater than 1	**Multiplication and Division** -Multiply and divide numbers mentally drawing on known facts -Multiply numbers up to 4-digits by a 1 or 2 digit number using the formal written method -Divide numbers up to 4 digit by a 1 digit using the formal written method -Solve problems involving a combination of addition, subtraction, multiplication and division, including understanding the use of the equals sign **Fractions** -Multiply unit fractions by an integer -Multiply non-unit fractions by an integer -Multiply mixed numbers by integers -Calculate fractions of a quantity	**Decimals and Percentages** -Read, write, order and compare numbers up to 3 decimals place -Recognise and use thousandths and relate to tenths, hundredths and decimal equivalents -Understand percentages -Percentages as fractions and decimals -Equivalent F,D,P **Perimeter and Area** -Measure and calculate the perimeter of composite rectilinear shapes -Calculate, compare and estimate the area of rectangles, compound and irregular shapes **Statistics** -Read and interpret line graphs -Draw line graphs -Use line graphs to solve problems -Read and interpret tables -Two-way tables	**Shape** -Identify 3D shapes including cubes and other cuboids from 2D representations -Use the properties of rectangles to deduce related facts and find missing lengths and angles -Distinguish between regular and irregular polygons based on reasoning about equal sides and angles -Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles -Draw given angles, and measure them in degrees -Angles on a straight line -Angles around a point **Position and Direction** -Position in the first quadrant -Translation -Translation with coordinates	**Decimals** -Adding and subtracting decimals within 1 -Adding decimals - crossing the whole -Adding and subtracting decimals with the same number of decimal places -Adding and subtracting decimals with a different number of decimal places -Adding and subtracting wholes and decimals -Decimal sequences -Multiplying and dividing decimals by 10, 100 and 1,000 **Converting Units** -Convert between different units of metric measure [for example, km and m; cm and m; cm and mm; g and kg; l and ml]. -Understand and use approximate equivalences between

	-Inverse operations (addition and subtraction) -Multi-step addition and subtraction problems -Compare calculations -Find missing numbers	-Add and subtract fractions with the same denominator -Add fractions within 1 -Add fractions with total greater than 1 -Add to a mixed number -Add two mixed numbers -Subtract fractions -Subtract from a mixed number -Subtract from a mixed number - breaking the whole -Subtract two mixed numbers	-Fraction of an amount -Using fractions as operators -Fraction problem solving	-Timetables	-Reflection -Reflection with coordinates **<u>Negative Numbers</u>** -Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers including through zero.	metric units and common imperial units such as inches, pounds and pints. -Solve problems involving converting between units of time
LITERACY	**Spelling strategies used in line with Literacy across the curriculum policy.** **Reading strategies used including key vocabulary and definitions used throughout topics.** **Use of frayer models for certain keywords.** **Stem sentences used to promote explanations.** **Improving written explanations through Purple Pen Policy.** **Mathematical representations used to explain their reasoning including #hashtags (#explainit).** **Showit / Drawit APP for explaining their reasoning and problem solving.** **Classroom display to promote literacy eg key words**					
NUMERACY:	**Number**		**Number, Geometry and Statistics**		**Number, Geometry and Measurements**	
SMSC/Creativity	**What's the same? What's different?** **I notice that...** **Explore questions at the start of each lesson.** **#prove it #convince me** **What do you see? What do you notice? What do you wonder?** **What could the question be?** **#story it** **Odd one out. And another, and another** **Spot the mistake** **Would this still be the case if…**			**Learning pit** **Can you think of an example that no one else has?** **Is there more than one solution?** **Could you use a different method? Which do you prefer and why?** **What do you already know?** **Could you use a previous problem to help you solve this? How?** **Investigating strategies and finding the most efficient strategy.** **#showme 2 different methods**		
Careers Focus	**Shop/Cafe owner TV Producer**	**Quantity Surveyor**	**Mortgage Advisor**	**Forensic Scientist**	**Geologist/ Ecologist**	**Construction worker (Builder)**

Year 6

Calculating using knowledge of structure
-Mental strategies
-Use of representations such as bar models

Place Value
-Numbers up to 10,000,000
-Read and write numbers to 10,000,000
-Powers of 10
-Number line to 10,000,000
-Compare and order any integers
-Round any integer
-Negative numbers

Written methods
-Add and Subtract integers including multi step problems
-Multiply up to 4 digits by a 2-digit number using the formal method
-Divide numbers up to 4 digits by 1 or 2 digit using the formal method
-Interpret remainders as whole number remainders, fractions, or by rounding as appropriate for the context
-Common Factors
-Common Multiples
-Prime Numbers
-Square and Cube numbers
-Order of operations

Fractions A
-Equivalent fractions and simplifying
-Equivalent fractions on a number line
-Compare and order (denominator)
-Compare and order (numerator)
-Add and subtract simple fractions
-Add and subtract any two fractions
-Add mixed numbers
-Subtract mixed numbers
-Multi-step problems

Fractions B
-Multiply fractions by integers
-Multiply fractions by fractions
-Divide a fraction by an integer
-Divide any fraction by an integer
-Mixed questions with fractions
-Fraction of an amount
-Fraction of an amount - find the whole

Position and Direction
-Describe positions on the full coordinate grid (all four quadrants)
-Translations
-Reflections

Ratio
-Ratio and fractions
-Calculating ratio
-Using scale factors
-Calculating scale factors
-Ratio and proportion problems

Decimals
-Identify the value of each digit in numbers given to 3 decimal places
-Multiply by 10, 100 and 1,000
-Divide by 10, 100 and 1,000
-Multiply decimals by integers
-Divide decimals by integers
-Solve problems which require answers to be rounded to specified degrees of accuracy
-Decimals as fractions
-Fractions to decimals

Fraction, Decimals and Percentages
-Understand percentages
-Fractions to percentages
-Use equivalences between simple fractions, decimals and percentages
-Order FDP
-Percentage of an amount

Shape
-Draw 2-D shapes using given dimensions and angles
-Compare and classify geometric shapes based on their properties and size
-Find unknown angles in any triangles, quadrilaterals and regular polygons
-Angles on a straight line
-Angles around a point
-Vertically opposite angles

Area, Perimeter and Volume
-Recognise that shapes with the same areas can have different perimeters and vice versa
-Recognise when it is possible to use formulae for area and volume of shapes
-Calculate the area of triangles and parallelograms
-Calculate, estimate and compare volume of cubes and cuboids using standard units

Converting Units
-Metric measures
-Convert metric measures
-Calculate with metric measures
-Miles and kilometres
-Imperial measures.

Statistics
-Illustrate and name parts of circles and know that the diameter is twice the radius
-Interpret and construct line graphs and use these to solve problems
-Interpret and construct pie charts and use these to solve problems
-Calculate the mean as an average

Algebra
-Use simple formula
-Generate and describe linear number sequences.
-Express missing number problems algebraically.
-Find pairs of numbers that satisfy an equation with two unknowns.
-Enumerate possibilities of combinations of two variables.

	-Estimation to check answers to calculations and determine in the context of a problem, an appropriate degree of accuracy					
LITERACY	**Spelling strategies used in line with Literacy across the curriculum policy.** **Reading strategies used including key vocabulary and definitions used throughout topics.** **Use of frayer models for certain keywords.** **Stem sentences used to promote explanations.** **Improving written explanations through Purple Pen Policy.** **Mathematical representations used to explain their reasoning including #hashtags (#explainit).** **Showit / Drawit APP for explaining their reasoning and problem solving.** **Classroom display to promote literacy eg key words**					
NUMERACY:	**Number and Geometry**		**Number, Geometry and Statistics**		**Algebra, Geometry and Measurements**	
SMSC/Creativity	**What's the same? What's different?** **I notice that...** **Explore questions at the start of each lesson.** **#prove it #convince me** **What do you see? What do you notice? What do you wonder?** **What could the question be?** **#story it** **Odd one out. And another, and another** **Spot the mistake** **Would this still be the case if…**		**Learning pit** **Can you think of an example that no one else has?** **Is there more than one solution?** **Could you use a different method? Which do you prefer and why?** **What do you already know?** **Could you use a previous problem to help you solve this? How?** **Investigating strategies and finding the most efficient strategy.** **#showme 2 different methods**			
Careers Focus	**Finance Manager**	**Microbiologist**	**Pharmacist/ Nutritionist**	**Meteorologist/ Sport Statistician**	**Architect/ Construction Engineer**	**Animator**

Year 7

Place Value
-Understand place value in integers
-Understand place value in decimals, including recognising exponent and fractional representations of the column headings
-Understand place value in the context of measure
-Order and compare numbers and measures using <, >, =

Properties of number
-Understand what a multiple is and be able to list multiples of n
-Identify and explain whether a number is or is not a multiple of a given integer
-Understand the concept of square and cube
-Understand the concept of square root and cube root
-Understand and use correct notation for positive integer exponents
-Understand how to use the keys for squares and other powers and square root on a calculator
-Understand what a factor is and be able to identify factors of positive integers
-Understand what a prime number is and be

Arithmetic procedures
-Understand the mathematical structures that underpin addition and subtraction of positive and negative integers
-Generalise and fluently use written addition and subtraction strategies, including columnar formats, with decimals
-Understand the mathematical structures that underpin multiplication and division of positive and negative integers
-Factorise multiples of 10n in order to simplify multiplication and division of both integers and decimals, e.g. 300 × 7000, 0.3 × 0.007, 0.9 ÷ 0.03, etc.
-Generalise and fluently use written multiplication strategies to calculate accurately with decimals
-Generalise and fluently use written division strategies to calculate accurately with decimals
-Know the commutative law and use it to calculate efficiently
-Know the associative law and use it to calculate efficiently
-Know the distributive law and use it to calculate efficiently
-Calculate using priority of operations, including brackets, powers,

Expressions and Equations
-Understand that a letter can be used to represent a generalised number
-Understand that algebraic notation follows particular conventions and that following these aids clear communication
-Know the meaning of and identify: term, coefficient, factor, product, expression, formula and equation
-Understand and recognise that a letter can be used to represent a specific unknown value or a variable
-Understand that relationships can be generalised using algebraic statements
-Understand that substituting particular values into a generalised algebraic statement gives a sense of how the value of the expression changes
-Identify like terms in an expression, generalising an understanding of unitising
-Simplify expressions by collecting like terms
-Understand how to use the distributive law to multiply an

Ordering and comparing
-Understand that 1 can be written in the form n / n (where n is any integer) and vice versa
-Understand that fractions of the form a / b where a > b are greater than 1 and use this awareness to convert between improper fractions and mixed numbers
-Understand that a fraction represents a division and that performing that division results in an equivalent decimal
-Appreciate that any terminating decimal can be written as a fraction with a denominator of the form 10n (e.g. 0.56 = 56 /100,560/ 1000, etc)
-Understand the process of simplifying fractions through dividing both numerator and denominator by common factors
-Know how to convert from fractions to decimals and back again using the converter key on a calculator
-Know how to enter fractions as divisions on a calculator and understand the limitations of the decimal representation that results

Arithmetic procedures
-Understand the mathematical structures that underpin the addition and subtraction of fractions
-Generalise and fluently use addition and subtraction strategies to calculate with fractions and mixed numbers
-Understand the mathematical structures that underpin the multiplication of fractions
-Understand how to multiply unit, non-unit and improper fractions
-Generalise and fluently use strategies to multiply with mixed numbers
-Understand the mathematical structures that underpin the division of fractions
-Divide a fraction by a whole number
-Divide a whole number by a fraction
-Divide a fraction by a fraction

Understanding multiplicative relationships
-Appreciate that any two numbers can be connected via a

Understanding multiplicative relationships
-Find a fraction of a given amount
-Given a fraction and the result, find the original amount
-Express one number as a fraction of another
-Be able to divide a quantity into a given ratio
-Be able to determine the whole, given one part and the ratio
-Be able to determine one part, given the other part and the ratio
-Use ratio to describe rates (e.g. exchange rates, conversions, cogs, etc.)

Transforming shapes
-Understand the nature of a translation and appreciate what changes and what is invariant
-Understand the minimum information required to describe a translation (vertical and horizontal displacement)
-Translate objects from information given in a variety of forms
-Understand the nature of rotations

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able to identify prime numbers
-Understand that a positive integer can be written uniquely as a product of its prime factors
-Use the prime factorisation of two or more positive integers to efficiently identify the highest common factor
-Use the prime factorisation of two or more positive integers to efficiently find their lowest common multiple

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exponents and reciprocals
-Use the associative, distributive and commutative laws to flexibly and efficiently solve problems
-Know how to fluently use certain calculator functions and use a calculator appropriately

Graphical representations
-Describe and plot coordinates, including non-integer values, in all four quadrants
-Solve a range of problems involving coordinates

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expression by a term such as 3(a + 4b) and 3p2(2p + 3b)
-Understand how to use the distributive law to factorise expressions where there is a common factor, such as 3a + 12b and 6p3 + 9p2b
-Apply understanding of the distributive law to a range of problem-solving situations and contexts (including collecting like terms, multiplying an expression by a single term and factorising), e.g. 10 – 2(3a + 5), 3(a ± 2b) ± 4(2ab ± 6b), etc.

Perimeter and area
-Use the properties of a range of polygons to deduce their perimeters
-Derive and use the formula for the area of a trapezium
-Understand that the areas of composite shapes can be found in different ways

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-Compare negative integers using < and >
-Compare decimals using < and >
-Compare and order fractions by converting to decimals
-Compare and order fractions by converting to fractions with a common denominator
-Order a variety of positive and negative fractions and decimals using appropriate methods of conversion and recognising when conversion to a common format is not required
-Appreciate that, for any two numbers there is always another number in between them

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multiplicative relationship
-Understand that a multiplicative relationship can be expressed as a ratio and as a fraction
-Be able to calculate the multiplier for any given two numbers
-Appreciate that there are an infinite number of pairs of numbers for any given multiplicative relationship (equivalence)
-Use a double number line to represent a multiplicative relationship and connect to other known representations
-Understand the language and notation of ratio and use a ratio table to represent a multiplicative relationship and connect to other known representations

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and appreciate what changes and what is invariant
-Understand the minimum information required to describe a rotation (centre of rotation, size and direction of rotation)
-Rotate objects using information about centre, size and direction of rotation
-Understand the nature of reflections and appreciate what changes and what is invariant
-Understand the minimum information required to describe a reflection (line of reflection)
-Reflect objects using a range of lines of reflection (including non-vertical and non-horizontal)
-Understand the nature of enlargements and appreciate what changes and what is invariant
-Understand the minimum information required to describe an enlargement (centre of enlargement and scale factor)
-Enlarge objects using information about the centre of enlargement and scale factor

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SMSC/Creativity	What's the same? What's different? I notice that... Explore questions at the start of each lesson. #prove it #convince me What do you see? What do you notice? What do you wonder? What could the question be? #story it Odd one out. And another, and another Spot the mistake Would this still be the case if…		Learning pit Can you think of an example that no one else has? Is there more than one solution? Could you use a different method? Which do you prefer and why? What do you already know? Could you use a previous problem to help you solve this? How? Investigating strategies and finding the most efficient strategy. #showme 2 different methods		
Careers Focus	**Accountant**	**Economist**	**Air traffic controller**	**Choreographer**	**Artificial Intelligence Engineer** / **Mechanical Engineer**

Year 8

Place value, estimation and rounding
- Round numbers to up to three decimal places
- Round numbers to any number of decimal places
- Understand the concept of significant figures
- Round integers to a required number of significant figures
- Round decimals to a required number of significant figures
- Understand what is meant by a sensible degree of accuracy
- Estimate numerical calculations
- Estimate and check if solutions to problems are of the correct magnitude
- Determine whether calculations using rounding will give an underestimate or overestimate
- Understand the impact of rounding errors when using a calculator, and the way that these can be compounded to result in large inaccuracies
- Calculate possible errors expressed using inequality notation $a < x \leq b$

Graphical representations
- Know that a set of coordinates, constructed according to a mathematical rule, can be represented algebraically and graphically
- Understand that a graphical representation shows all of the points (within a range) that satisfy a relationship
- Recognise that linear relationships have particular algebraic and graphical features as a result of the constant rate of change
- Understand that there are two key elements to any linear relationship: rate of change and intercept point
- That writing linear equations in the form y = mx + c helps to reveal the structure
- Solve a range of problems involving graphical and algebraic aspects of linear relationships

Solving linear equations
- Recognise that there are many different types of equations of which linear is one type
- Understand that in an equation the two sides of the 'equals' sign balance
- Understand that a solution is a value that

Understanding multiplicative relationships
- Use a graph to represent a multiplicative relationship and connect to other known representations
- Use a scaling diagram to represent a multiplicative relationship and connect to other known representations
- Describe one number as a percentage of another
- Find a percentage of a quantity using a multiplier
- Calculate percentage changes (increases and decreases)
- Calculate the original value, given the final value after a stated percentage increase or decrease
- Find the percentage increase or decrease, given start and finish quantities
- Understand the connection between multiplicative relationships and direct proportion
- Recognise direct proportion and use in a range of contexts including compound measures

Statistical representations and measures
- Understand what the mean is measuring, how it is measuring it and calculate the mean from data presented in a range of different ways
- Understand what the median is measuring, how it is measuring it and find the median from data presented in a range of different ways
- Understand what the mode is measuring, how it is measuring it and identify the mode from data presented in a range of different way
- Understand what the range is measuring, how it is measuring it and calculate the range from data presented in a range of different ways
- Construct bar charts from data presented in a number of different ways
- Construct pie charts from data presented in a number of different ways
- Construct pictograms from data presented in a number of different ways
- Construct scatter graphs from data presented in a number of different ways

Perimeter, area and volume
- Recognise that there is constant multiplicative relationship (π) between the diameter and circumference of a circle
- Use the relationship C = πd to calculate unknown lengths in contexts involving the circumference of circles
- Understand the derivation of, and use the formula for, the area of a circle
- Solve area problems of composite shapes involving whole and/or part circles, including finding the radius or diameter given the area
- Understand the concept of surface area and find the surface area of 3D shapes in an efficient way
- Be aware that all prisms have two congruent polygonal parallel faces (bases) with parallelogram faces joining the corresponding vertices of the bases
- Use the constant cross-sectional area property of prisms and cylinders to determine their volume

Geometrical properties
- Understand that a pair of parallel lines traversed by a straight line produces sets of equal and supplementary angles
- Know and understand proofs that in a triangle, the sum of interior angles is 180 degrees
- Know and understand proofs for finding the interior and exterior angle of any regular polygon
- Solve problems that require use of a combination of angle facts to identify values of missing angles, providing explanations of reasoning and logic used

		Sequences	makes the two sides of an equation balance	-Recognise and use inverse proportionality in a range of contexts	**Statistical analysis**		
		-Appreciate that a sequence is a succession of terms formed according to a rule	-Understand that a family of linear equations can all have the same solution		-Understand that the different measures of central tendency offer a summary of a set of data		

Sequences
-Appreciate that a sequence is a succession of terms formed according to a rule
-Understand that a sequence can be generated and described using term-to-term approaches
-Understand that a sequence can be generated and described by a position-to-term rule
-Understand the features of an arithmetic sequence and be able to recognise one
-Understand that any term in an arithmetic sequence can be expressed in terms of its position in the sequence (nth term)
-Understand that the nth term allows for the calculation of any term
-Determine whether a number is a term of a given arithmetic sequence

makes the two sides of an equation balance
-Understand that a family of linear equations can all have the same solution
-Solve a linear equation requiring a single additive step
-Solve a linear equation requiring a single multiplicative step
-Understand that an equation needs to be in a format to be 'ready' to be solved, through collecting like terms on each side of the equation
-Know that when an additive step and a multiplicative step are required, the order of operations will not affect the solution
-Recognise that equations with unknowns on both sides of the equation can be manipulated so that the unknowns are on one side
-Solve complex linear equations, including those involving reciprocals
-Appreciate the significance of the bracket in an equation
-Recognise that there is more than one way to remove a bracket when solving an equation
-Solve equations involving brackets where simplification is necessary first

-Recognise and use inverse proportionality in a range of contexts

Statistical analysis
-Understand that the different measures of central tendency offer a summary of a set of data
-Understand how certain statistical measures may change as a result in changes of data
-Understand range as a measure of spread, including a consideration of outliers
-Understand that the different statistical representations offer different insights into a set of data
-Use the different measures of central tendency and spread to compare two sets of data
-Use the different statistical representations to compare two sets of data
-Recognise relationships between bivariate data represented on a scatter graph
-Given a statistical problem, choose what data needs to be analysed to explore that problem
-Given a statistical problem, choose appropriate statistical measures to explore that problem
-Given a statistical problem, choose

			appropriate representations to explore that problem -Given a statistical problem, choose appropriate measures and representations to effectively summarise and communicate conclusions			
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NUMERACY:	**Sequences and Graphs/Operating on number**		**Multiplicative Reasoning/Statistics**		**Geometry**	
SMSC/Creativity	What's the same? What's different? I notice that… Explore questions at the start of each lesson. #prove it #convince me What do you see? What do you notice? What do you wonder? What could the question be? #story it Odd one out. And another, and another Spot the mistake Would this still be the case if…		Learning pit Can you think of an example that no one else has? Is there more than one solution? Could you use a different method? Which do you prefer and why? What do you already know? Could you use a previous problem to help you solve this? How? Investigating strategies and finding the most efficient strategy. #showme 2 different methods			
Careers Focus						