Year 7: Cycle of Topics Per Year

1. Algebra 1 and Number 1
2. Geometry 1 and Number 2
3. Number 3 and Statistics 1
4. Algebra 2 and Geometry 2
5. Number 4 and Number 5
6. Geometry 3

Year 7 Mathematics

In Year 7, pupils follow a mastery-based approach to Mathematics which enables them to enhance the fluency, reasoning and problem-solving skills they have developed during Primary School. Throughout their studies, pupils will have the opportunity to study number, algebra, geometry and statistics, to note but a few, and apply their understanding of these topics to a range of knowledge-based and problem-solving questions. Teaching of problem-solving will involve working with pupils to ensure they have a solid understanding of how to construct clear, logical mathematical thinking and, in turn, how to translate this to comprehensive mathematical working. The internal exam in Year 7 will be a non-calculator paper inspired by the White Rose Mastery Maths curriculum. Pupils will also sit regular Check-Ins throughout the year, so as to ensure that both pupils and their class teacher have an in-depth understanding of their areas of strength and areas for improvement. Pupils will be encouraged to participate in the UKMT Junior Maths Challenge and attend Maths ExEn puzzle club to further develop a passion for Mathematics outside of the prescribed classroom setting.

A number of learning points on the Overview of Knowledge and Skills are listed with an asterisk (*). This denotes that such learning points are **Higher Strand** and are only to be followed at the teacher's discretion, following the class having shown evidence of in-depth knowledge of the previous learning points. It is worth noting that **Higher Strand** learning points are not limited to any particular Sets and teaching such objectives will be at the teacher's discretion in accordance with the needs of their group. Learning points listed with 'R', are recap points which have been covered, albeit briefly, in previous years.

Topic of Learning		Half-Termly Overview: Knowledge and Skills
HT1	**Algebra 1** • Algebraic Notation • Simplifying Algebra • Substitution	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Algebra 1. • Understand why we use algebra and what it represents. • Simplify algebraic expressions, including adding, subtracting, multiplying and dividing terms. • Understand the difference between like and unlike terms. • Collect like terms (using positive terms). • Understand the concept of equivalence and recognise equivalent expressions. • Substitute values into expressions (link to BIDMAS).

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	Number 1	By the end of the unit, pupils should be able to:
	- Place Value - Comparing and Ordering Integers and Decimals - Mental Strategies to Add and Subtract - Directed Number	- Understand key vocabulary relating to Number 1. - Write worded numbers up to one billion as digits and vice versa. - Identify the place value of any digit in a number up to one billion. - Work with tenths, hundredths and thousandths in a range of formats (decimal, fractional and worded). - Compare and order decimals. - Employ mental strategies to add and subtract (partitioning, sequencing and compensation). - Multiply and divide by powers of 10. - Understand negative numbers in context e.g. temperature. - Compare and order negative numbers. - Add and subtract negative numbers. - Collect like terms (both positive and negative terms).
HT2	Geometry 1	By the end of the unit, pupils should be able to:
	2D Shapes - Converting Units - Calculating Perimeter - Calculating Area	- Understand key vocabulary relating to Geometry 1. - Understand the difference between perimeter and area. - Recall the properties and names of 2D shapes, including the different types of triangle. - Convert fluently between metric units. - Understand notation for perimeter, including parallel sides and equal sides. - Calculate the perimeter of shapes, including compound shapes. - Identify parallel and perpendicular lines. - Calculate the area of quadrilaterals (inc. parallelograms), triangles, trapezia* and compound shapes. - Find missing lengths of a shape, given its perimeter. - Find missing lengths of a shape, given its area. - Solve problems involving algebra, and perimeter and area.
	Number 2	By the end of the unit, pupils should be able to:
	Factors and Multiples	Understand key vocabulary relating to Number 2.

	• Prime Numbers • Square Numbers	• Identify factors and multiples of a number. • Use divisibility rules to aid identification of factors. • Recognise prime numbers. • Recall and recognise square numbers. • Understand how to square root a number. • Understand the meaning of the following symbols =, ±, ≠, ≈, <, >, °, ∴ , ≡. • Apply knowledge of the above symbols to equivalent expressions in algebra, calculations involving square numbers and calculations with directed number.
HT3	**Number 3** • Nature of Multiplying and Dividing • The Four Operations • Working with Decimals	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Number 3, notably the ability to recognise synonyms for the four operations. • Understand that multiplication is commutative and division is associative. • Use written methods for each of the four operations. • Use known facts and fact families to derive other facts. • Calculate with decimals and the four operations. • Understand the effect of dividing by 0.1, 0.01, 0.5 and 0. • Solve worded problems involving the four applications (application to money).
	Statistics 1 • Data Representation • Calculating Averages • Evaluating Averages	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Statistics 1. • Use tally charts. • Draw and interpret pictograms. • Draw and interpret bar charts and multiple bar charts. • Understand what an 'average' is and how it is different to a measure of spread. • Calculate the mean of a data set. • Calculate the median of a data set.

		• Calculate the mode of a data set.
		• Calculate the range of a data set.
		• Evaluate each average and understand the advantages and disadvantages of each one.
		• Choose the most appropriate means of calculating the average of a data set using context.
	Algebra 2 • Expanding Single Brackets • Factorising Expressions • Solving One-Step Equations	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Algebra 2. • Expand single brackets. • Expand and simplify multiple sets of single brackets. • Factorise expressions (using single brackets), involving terms with powers greater than 1. • Understand the concept of inverse operations. • Solve one step equations e.g. $5y = 12.5$, $x + 3.2 = 7.1$, $\frac{a}{4} = 1.6$. • Solve one step equations in worded form. • Apply knowledge of algebra to perimeter and area problems.
HT4	**Geometry 2** • Angle Notation • Estimating and Measuring Angles • Basic Angle Rules • Solving Problems with Angles	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Geometry 2. • Understand an angle as a measure of turn. • Understand letter and labelling conventions. • Understand angle notation (right angle, double arc). • Recognise different types of angle (acute, obtuse, right angle, reflex). • Estimate the size of angles. • Measure angles, including those which are reflex, accurately. • Draw angles accurately. • Understand and use the sum of angles at a point. • Understand and use the sum of angles on a straight line. • Understand and use the equality of vertically opposite angles. • Solve angle problems using properties of triangles. • Solve complex angle problems. • Apply knowledge of algebra to problems involving angles.

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HT5	**Number 4** • Fractions and Wholes • Improper Fractions and Mixed Numbers • Equivalent Fractions • Fraction of amounts	**By the end of the unit, pupils should be able to:** • Understand key vocabulary related to Number 4. • Locate a fraction on a number line. • Understand the nature of a whole (e.g. $1 - \frac{3}{8} = \frac{5}{8}$). • Convert between improper fractions and mixed numbers. • Identify equivalent fractions. • Simplifying fractions. • Multiply fractions, including improper fractions and mixed numbers. • Understand how to find the reciprocal. • Divide fractions, including improper fractions and mixed numbers. • Find a fraction of a quantity. • Compare fractions, including improper fractions and mixed numbers, using the following symbols: $< > = \neq$.
	Number 5 • Rounding numbers to the nearest 10. • Rounding numbers to the nearest 1, 2 and 3 decimal places. • Powers of 10	**By the end of the unit, pupils should be able to:** • Understand key words related to Number 5 (integer, decimal, decimal place, place holder, estimation). • Round integers to the nearest 10, 100 and 1000. • Round decimals to one, two and three decimal places. • Input operations into a calculator, including how to square root a number, how to square/cube a number, the SD button and fractional input. • Understand powers of 10 and how to write them as ordinary numbers. • Write positive integers in the form $A \times 10^n$. • Investigate negative powers of 10. • Write decimals in the form $A \times 10^n$.
HT6	**End of Year Assessment** **Geometry 3** • Symmetry • Reflection • Rotational Symmetry	**By the end of the unit, pupils should be able to:** • Understand key words relating to Geometry 3. • Identify the number of lines of symmetry a 2D shape has. • Reflect shapes vertically and horizontally in a given mirror line (including in x and y axes). • Understand rotational symmetry and how it is different to symmetry. • Understand the key features of tessellation and how to recognise it.

	• Tessellation	• Create their own tessellating pattern or artwork.

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Year 8: Cycle of Topics Per Year

1. Number 6 and Algebra 3

2. Number 7 and Geometry 4

3. Number 8 and Geometry 5

4. Statistics 2 and Algebra 4

5. Number 9 and Geometry 6

6. Probability 1

Year 8 Mathematics

In Year 8, pupils follow a mastery-based approach to Mathematics which enables them to enhance the fluency, reasoning and problem-solving skills they have developed during Year 7. Throughout their studies, pupils continue to develop their depth of mathematical understanding through revisiting concepts secured in Year 7 and continually building on this across the breadth of the curriculum. Across the year, pupils will be introduced to new content, while also completing frequency retrieval practice to ensure that their mathematical foundations are solid. Explicit links will begin to become evident between sub-topics of the curriculum allowing pupils to identify and increase their fluency in mathematics, transferring skills from one topic to the next. The internal exam in Year 8 is inspired by the White Rose Mastery Maths curriculum. The internal exam will provide pupils with the opportunity to apply and demonstrate the mathematical skills they have developed throughout the year. Pupils will be encouraged to participate in the UKMT Junior Maths Challenge and attend Maths ExEn puzzle club and Maths ExEn Clinic.

A number of learning points on the Overview of Knowledge and Skills are listed with an asterisk (*). This denotes that such learning points are **Higher Strand** and are only to be followed at the teacher's discretion, following the class having shown evidence of in-depth knowledge of the previous learning points. It is worth noting that **Higher Strand** learning points are not limited to any particular sets and teaching such objectives will be at the teacher's discretion in accordance with the needs of their group. Learning points listed with 'R', are recap points which have been covered, albeit briefly, in previous years.

Topic of Learning		Overview of Knowledge and Skills
HT1	**Number 6** • Percentages • Percentages of amounts • Converting between fractions, decimals and percentages	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Number 6. • Understand the concept of percentages. • Convert tenths and hundredths between fractional, decimal and percentage form. • Convert fluently between fractions, decimals and percentages without a calculator. • Convert fluently between fractions, decimals and percentages with a calculator. • Compare and order fractions, decimals and percentages. • Calculate percentages of amounts, with and without a calculator. • Use and interpret simple pie charts, using knowledge of percentages and fractions.

Algebra 3
- Algebraic expressions
- Directed number
- Brackets
- Expand double brackets
- Solve two-step equations

By the end of the unit, pupils should be able to:
- Understand key vocabulary relating to Algebra 3.
- Form algebraic expressions e.g. translating between phrases such as 'five more than k' and $k + 5$.
- Multiply and divide directed number.
- Expand and simplify multiple single brackets, such as $5 + 3(x + 8)$.
- Expand and simplify double brackets.*
- Solve two-step equations e.g. $2x + 5 = 9, 5.3 = 8y + 2, \frac{b}{4} + 4.1 = 7.3, \frac{d-5.4}{6} = 9.7$.
- Solve equations with brackets, e.g. $4(y + 2) + 3.6 = 15.2$.

HT2

Number 7
- Square and Cube Numbers
- Calculator Skills
- Using the Laws of Indices

By the end of the unit, pupils should be able to:
- Understand key vocabulary relating to Number 7.
- Recall square and numbers, and the square and cube roots of such numbers respectively.
- Calculate the perimeter of a square, given its area.
- Understand how to input negative numbers into a calculator and understand why (-4)^2 gives a different answer to -4^2.
- Understand what indices represent.
- Multiply and divide expressions with indices, e.g. $25a^2 \div 5a$
- Understand the Addition Law for Indices.

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- Understand the Subtraction Law for Indices.
- Understand powers of powers.*
- Express a number as a product of primes using index notation.

Geometry 4	By the end of the unit, pupils should be able to:
• Constructing triangles • Basic Angle Facts • Angles in Parallel Lines	• Understand key vocabulary relating to Geometry 4. • Classify triangles using their properties (R). • Construct triangles using SSS, SAS, ASA. • Construct an angle bisector. • Solve angle problems, reviewing angle facts taught in Year 7: angles on a straight line, angles around a point and vertically opposite angles, classifying angles. • Identify and calculate with alternate, corresponding and co-interior angles. • Solve complex problems involving angles in parallel lines. • Apply knowledge of algebra to questions involving missing angles in parallel lines.

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	Number 8	**By the end of the unit, pupils should be able to:**
	• Significant Figures • Finding the LCM and HCF • Adding and Subtracting Fractions	• Understand key vocabulary relating to Number 8. • Round integers and decimals to 1, 2 and 3 significant figures. • Estimate calculations using knowledge of significant figures. • Identify the HCF and LCM of a pair of numbers (using a Venn Diagram*). • Add and subtract fractions with the same denominator, with denominators which are multiples of each other and with unrelated denominators. • Add and subtract mixed numbers and improper fractions. • Apply knowledge of adding and subtracting fractions to finding the perimeter of shapes, including compound shapes, and to directed number.* • Apply fractions to algebraic contexts.* • Add and subtract simple algebraic fractions.*
HT3	**Geometry 5** • 2D Shapes • Area of Compound Shapes, Trapezia and Circles • Substitution and Formulae	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Geometry 5. • Recall the names and properties of 2D shapes. (R) • Calculate the perimeter of compound shapes. • Find the area of compound shapes made up of polygons. • Apply knowledge of area to problem-solving questions. • Substitute values into formulae, when the value to be calculated is (and is not*) the subject of the formula. • Identify parallel and perpendicular lines. (R) • Calculate the area of trapezia. • Understand circle properties. • Calculate the area of a circle. • Find the radius of a circle, given its area.* • Find the area of compound shapes, involving semi-circles

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	Statistics 2 • Scatter Graphs • Discrete and Continuous Data • Reading and Interpreting Data	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Statistics 2. • Draw and interpret scatter graphs. • Draw and use the line of best fit. • Understand the concept of extrapolation. • Identify outliers and understand the possible impact this can have when finding the range. • Identify different types of data: discrete or continuous. • Design and criticise questionnaires. • Read and interpret ungrouped and grouped frequency tables. • Calculate the mode and range from a frequency table. • Calculate the mean from an ungrouped frequency table.* • Represent data in two way tables.
HT4	**Algebra 4** • Substitution and formulae • Inequalities • Sequences	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Algebra 4. • Identify expressions, identities, formulae and equations. • Substitute values into more complex expressions. • Apply knowledge of formulae and substitution to Speed, Distance, Time. • Understand and solve simple inequalities. • Form, and solve, inequalities from worded questions. • Understand the difference between a linear and non-linear sequence. • Understand how to find the term to term rule of a sequence. • Continue a sequence, given a worded or numerical rule. • Generate a sequence using both simple (e.g. $2n + 1$) and more complex (e.g. $4n^2$) algebraic rules. • Calculate the nth term of a linear sequence.
HT5	**Number 9 (with Geometry)** • Understanding	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Number 9. • Understand what a ratio represents.

	Ratio • Ratios in the form 1:n and m:n. • Simplifying Ratio • Ratio and Fractions	• Use and understand ratio notation. • Work with ratios in the form 1:n and m:n. • Identify equivalent ratios. • Share amounts in a ratio. • Simplify ratio. • Relate ratio to proportion and fractions. • Understand π as the ratio between diameter and circumference. • Calculate the circumference of a circle. • Calculate the perimeter of compound shapes, involving semi-circles.
	Geometry 6 • 3D Shapes • Volume • Transformations	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Geometry 6. • Recall the names and properties of 3D shapes. • Understand the concept of volume. • Calculate the volume of cubes and cuboids. • Recognise a prism. • Calculate the volume of a prism, including trapezoidal prisms. • Calculate the volume of a cylinder. • Calculate the volume of a sphere.* • Understand the effect of rotating a shape and describe a rotation. • Understand the effect of translating a shape and describe a translation. • Combine transformations.*
HT6	**End of Year Assessment** **Probability 1**	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Probability 1. • Use the vocabulary of probability and the probability scale to determine the probability of an event. • Calculate the probability of a single event in a range of formats; percentages, fractions and decimals.

• The Probability Scale • Probability of a Single Event • Probabilities sum to 1	• Use the idea that probabilities sum to 1 to calculate missing probabilities.

Year 9: Cycle of Topics Per Year

1.

2. Number 7 and Geometry 4

3. Number 8 and Geometry 5

4. Statistics 2 and Algebra 4

5. Number 9 and Geometry 6

6. Probability 1

Year 9 Mathematics

The Mathematics curriculum in Year 9 is designed to ensure that pupils are fully prepared for the challenges of GCSE Mathematics. Throughout the year, pupils continue to enhance their mathematical toolkit and work to ensure that their key mathematical knowledge is consolidated. Retrieval Practice will thus play a significant role in ensuring that content covered prior to this year is regularly revisited and reviewed. The internal examinations at the end of the year will give pupils the opportunity to demonstrate their learning to date and also provide vital data to establish the best tier progression for GCSE upon moving into KS4. Pupils will be set two pieces of homework per week (45 minutes per piece) to spend time consolidating their learning outside of the classroom setting.

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Topic of Learning	Half-Termly Overview: Knowledge and Skills

HT1	**Algebra 5** • Expanding brackets • Factorising expressions	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Algebra 5. • Collect like terms using knowledge of directed number. (R) • Substitute values into expressions using knowledge of directed number. (R) • Expand and simplify single and multiple single brackets. (R) • Expand and simplify and double brackets. • Factorise expressions into a single bracket, including with quadratic terms. (R) • Factorise expressions in the form $ax^2 + bx + c$ into double brackets when the coefficient of x^2 is 1.*
	Geometry 7 • Nets • Plans and elevations • Calculating surface area	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Geometry 7. • Recall the names and properties of 2D and 3D shapes, including faces, edges and vertices. (R) • Draw nets of 3D shapes. • Draw plans and elevations. • Calculate the area of 2D shapes. (R) • Calculate the surface area of cubes, cuboids, prisms and pyramids. • Calculate the surface area of cylinders.* • Solve problems linking both surface area and volume of 3D shapes.*

HT2	**Number 10** • FDP equivalence • Percentage increase and decrease • Percentage change	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Number 10. • Apply fraction, decimal and percentage equivalence. (R) • Calculate percentage increase and decrease using multipliers. • Calculate percentage change. • Calculate repeated percentage change.* • Solve reverse percentage problems.* • Solve worded problems involving percentages with and without a calculator.
	Geometry 8 • Squaring and square rooting • Pythagoras' Theorem	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Geometry 8. • Understand squaring and square rooting. (R) • Identify the hypotenuse of a right-angled triangle. • Calculate the hypotenuse of a right-angled triangle. • Calculate missing sides in right-angled triangles. • Determine whether a triangle is right-angled. • Apply Pythagoras' Theorem to find lengths in other shapes e.g. diagonals in rectangles, the perimeter of an isosceles triangle given its base length and perpendicular height.

Probability 2
- Sample spaces
- Relative frequency
- Independent events
- Tree diagrams*

By the end of the unit, pupils should be able to:
- Understand key vocabulary relating to Probability 2.
- Calculate single event probability. (R)
- Construct sample spaces for 1 or more events.
- Calculate probability from two-way tables.
- Understand relative frequency and experimental probability.
- Understand how theoretical probability and experimental probability are different.
- Calculate the probability of independent events.
- Use tree diagrams to calculate probability.*

HT3

Algebra 6
- Solving equations with unknowns on both sides
- Solving inequalities
- Rearranging formulae

By the end of the unit, pupils should be able to:
- Understand key vocabulary relating to Algebra 6.
- Recall how to use different mathematical symbols in context, including $\neq, \pm, <, >, \leq, \geq$. (R)
- Understand the concept of inverse operations.
- Solve one-step and two-step equations. (R)
- Solve one-step (R) and two-step inequalities.
- Solve inequalities involving negative numbers.
- Solve equations with unknowns on both sides.
- Solve inequalities with unknowns on both sides.
- Solve equations and inequalities in context.*
- Rearrange formulae involving one-step.
- Rearrange more complex formulae; formulae including two-step, brackets and squares.*

HT4	**Geometry 9** • Angles in parallel lines • Exterior and interior angles	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Geometry 9. • Understand and use basic angle rules and notation. (R) • Identify and calculate with angles in parallel lines; notably, corresponding, alternate and co-interior angles. (R) • Understand what a polygon is, and name examples and non-examples of polygons. • Understand and use the sum of exterior angles in any polygon. • Understand and use the sum of interior angles in any polygon. • Calculate the number of sides of a shape, given the interior/exterior angle.* • Construct a perpendicular bisector.
	Number 11 • Powers of 10 • Standard form • Indices*	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Number 11. • Understand powers of 10 and how to write them as ordinary numbers. (R) • Understand negative powers of 10 and how to write them as ordinary numbers. (R) • Write positive integers and decimals in the form $A \times 10^n$. (R) • Compare and order numbers in standard form. • Add and subtract numbers in standard form. • Multiply and divide numbers in standard form. • Understand and use negative indices.* • Understand and use fractional indices.*
HT5	**Geometry 10 (with Algebra)**	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Geometry 10.

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• Working in the Cartesian Plane • Straight line graphs	• Work with coordinates in all **4** quadrants. • Draw lines parallel to the axes, $y = x$ and $y = -x$. • Use tables of values to plot linear graphs. • Understand and use $y = mx + c$: identify the gradient and y-intercept of a line, including knowing whether a particular point lies on a given line. • Write equations in the form $y = mx + c$, using knowledge of rearranging formulae..* • Identify the equation of a line from a graph. • Recognise that the product of two perpendicular lines is -1.*
Statistics 3 • Distance Charts • Timetables • Stem and Leaf diagrams • Interpreting ungrouped and grouped frequency tables	**By the end of the unit, pupils should be able to:** • Understand key vocabulary relating to Statistics 3. • Read and interpret distance charts. • Draw and interpret time series graphs. • Construct and interpret stem and leaf diagrams. • Interpret back-to-back stem and leaf diagrams.* • Calculate the mean, mode, median and range from an ungrouped frequency table. (R) • Calculate the mean, mode and range from a grouped frequency table. • Calculate the median from a grouped frequency table*.
End of Year Assessment	**By the end of the unit, pupils should be able to:**

HT6	Number 12 (with Algebra) • Proportion • Conversion graphs • Applications of ratio	• Understand key vocabulary relating to Number 12. • Understand the concept of direct and indirect proportion. • Interpret conversion graphs in terms of direct proportion. • Solve problems involving ratio. • Solve problems involving 'Best Buys'. • Solve ratio problems with algebra.*