Mathematics Unit Overview
Year 8

The Year 8 curriculum, as for all years, is a spiral curriculum which enables us to recap and build on topics covered in KS2 and Year 7. Ever mindful of the potential gaps or misconceptions caused by lost face-to-face learning, each topic recaps key skills that may not have been mastered.

Students in year 8 are in sets based on prior attainment, flightpaths, results from their Year 7 assessments, and Year 7 teacher input. Sets 1-3 follow the main curriculum, with sets 4 and 5 missing some of the higher-grade skills; this is with a view to Higher vs. Foundation trajectories. Sets are reviewed after every half term assessment to enable every student to succeed.

Key knowledge on which we will recap and build during Year 8 includes:

- Prime numbers, factors, and multiples
- Four operations on integers, decimals and fractions
- Co-ordinates and equations of vertical and horizontal lines
- Basic rules of algebra
- Solving one and two-step equations
- Substitution
- FDP equivalence
- Expressing and simplifying a ratio
- Patterns in a sequence
- Basic angle facts – at a point, on a line, vertically opposite
- Perimeter an area of a rectangle, triangle, parallelogram, and trapezium
- Volume and surface area of a cuboid
- Bar and pie charts
- Calculating Mean, Median, Mode and Range from a list of data

Mathematics - Year 8 Unit 1				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Numbers and the number system.	Knowledge: Identify prime numbers and factors. Write and interpret index form. Identify significant figures. Represent powers of ten in index form. Skills: Write a number as a product of its prime factors. Round numbers to 1 and 2 significant figures. Convert between numbers in standard form and ordinary numbers. Understanding: Students will use prime factorisation to find the HCF and LCM of numbers of any size.	Students will be able to use a factor tree to write numbers as a product of their prime factors and write those factors using index notation. Students will know how to use a Venn diagram to identify the highest common factor and lowest common multiple. Students will understand why we write numbers in standard form. Students will be able to fluently convert between ordinary numbers and numbers in standard form .	Unit 7.1 Prime numbers, multiples, HCF and LCM from lists Unit 7.2 Multiplying and dividing by powers of 10 Unit 7.3 Rounding to 1 and 2 decimal places Rounding to 1 significant figure	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Softschools.com prime numbers game Transum.org – factor trees and puzzles

Mathematics - Year 8 Unit 2				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Calculating with negative numbers.	Knowledge: Know the rules for adding, subtracting, multiplying and dividing positive and negative numbers Finding the square and cube of negative numbers Skills: Apply the rules of operations with negative numbers to powers and roots. Use scientific calculator to calculate with fractions, negatives and powers. Understanding: Apply the knowledge of negative numbers and powers to multi operational questions using BIDMAS.	Students will be able to work with all four operations and negative numbers and will be able to explain their solutions to questions in a variety of ways. Students will understand that BIDMAS is used in all mathematical calculations regardless of context and will be able to apply their knowledge of negatives and powers to BIDMAS calculations. Students will be able to use a calculator to work with negatives and will be able to explain and rectify an incorrect sequence of key presses which lead to a wrong answer.	Unit 7.1 Powers and roots Unit 7.2 Multiplication facts BIDMAS Four rules for integers and decimals Unit 7.4 Comparing negative numbers	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum negative numbers

Mathematics - Year 8 Unit 3				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Visualising and constructing.	Knowledge: Multiplication by integers and fractions. Co-ordinate geometry. Use of ratio to compare quantities. Skills: Enlarge a shape by a positive integer or a fraction, with and without a centre of enlargement. Describe an enlargement by identifying the centre of enlargement and the scale factor. Draw and interpret scale diagrams and maps. Understanding: Decide whether a 2D shape will get bigger or smaller following an enlargement. To fully describe an enlargement, three facts must be stated. Manipulate scales to calculate distances on maps and lengths on models.	Students will be able to enlarge a shape by a given scale factor with a given centre of enlargement Students will be able to predict where the enlarged shape will lie in relation to the original given a centre and a scale factor. Students will understand what a scale of 1:200 000 means on a map, and how to use it to calculate distances.	Unit 7.9 Write a ratio and simplify Unit 7.13 Multiply by a fraction Unit 7.16 Co-ordinates in four quadrants Translation, reflection	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 4				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Understanding risk	Knowledge: Understand the meaning of probability Express probability as a fraction, decimal or percentage. Probabilities sum to 1. Skills: List the outcomes of an event or combination of events and identify theoretical probability. Construct a sample space diagram and deduce probabilities of outcomes from it. Calculate the expected outcomes by applying probability. Understanding: Explain the limitations of verbal expressions of likelihood. Articulate the difference between theoretical and experimental probability.	Students will be able to use the language of chance to describe likelihood and understand when a theoretical probability is required. Students will know how to list the outcomes of an event, or a combination of events, and will be able to use this to calculate probabilities.	Unit 7.4 Checking and comparing equivalence between common fractions, decimals and percentages Unit 7.13 Four operations and fractions	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 5				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Algebraic Proficiency: Manipulation	Knowledge: Identify factors of algebraic terms. Apply correct algebraic notation. Manipulate algebraic expressions. Know the laws of indices. Identify the subject of a formula. Skills: Factorise algebraic expressions involving multiple variables and indices. Apply the laws of indices. Substitute positive and negative numbers into formulae. Apply BIDMAS. Change the subject of a formula. Understanding: Interpret the meaning of a formula both before and after substitution. Interpret the meaning of a formula where the subject has been changed.	Students will be able to manipulate expressions effectively. Students can factorise expressions involving multiple variables and indices, then check they are correct by expanding. Students will be able to manipulate complex indices problems needs more than one step to work out. Students can substitute numbers and fractions into equations and solve for a result.	Unit 7.1 Powers and roots Unit 7.7. Manipulating algebraic expressions. Expanding brackets.	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 6				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Exploring fractions, decimals and percentages	Knowledge: Simplify fractions. Explain the difference between a terminating and recurring decimal. Recall common fraction, decimal and percentage equivalents. Skills: Identify whether a fraction will convert to a recurring or terminating decimal by applying prime factor decomposition. Convert decimals to fractions without using a calculator. Change fractions to decimals with and without a calculator. Understanding: Order a mixed list of fractions decimals and percentages.	Students will be able to explain why a fraction and a decimal are equivalent. Explain what is similar and what is different in a list of fractions, decimals and percentages. Solve missing digit puzzles involving fractions and percentages	Unit 7.4 Ordering fractions with same and different denominators Unit 7.8 Converting between mixed numbers and improper fractions, fraction, decimal and percentage equivalence Unit 7.13 Calculating with fractions decimals and percentages	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 7				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Proportional Reasoning	Knowledge: Interpret ratio as the comparison of two quantities. Skills: Divide in a ratio. Apply the relevant multiplier to a proportion problem. Convert between ratio and fractions. Apply the unitary method. Understanding: Representation of ratio problems as a bar model. Apply ratio and proportion to recipe problems. The relevance of proportional relationships to real life.	Student can draw a bar model for a given problem and use to solve the problem. Student can set up a proportion table and use to solve the problem. Identify and rectify an error in a calculation Explain the solution to a problem using appropriate language and notation Explain what would happen if one element of a question was altered. Create and show examples of two quantities that are in proportion	Unit 7.9 Writing a ratio and simplifying. Divide in a ratio.	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 8				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Pattern Sniffing	Knowledge: Recognition of sequences and their term-to-term rule Skills: Generate a sequence from its position-to-term rule. Find the nth term of an increasing or decreasing linear sequence. Write and solve an nth term equation to identify if a given number is in a sequence. Understanding: Explain that the term-to-term rule is an inefficient way to calculate a given term of a sequence and therefore why a position-to- term rule is needed.	Students can identify the nth term of any given linear sequence. Students can use an nth term equation to deduce if a given number is in a sequence Identify and rectify an error in a calculation Explain the solution to a problem using appropriate notation Explaining what would happen if one element of a question was altered.	Unit 7.10 Continuing a sequence and term-to-term rules.	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 9				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Investigating Angles	Knowledge: Angle facts relating to parallel lines. Skills: To calculate the value of a missing angle in parallel lines. Apply other angle facts as required. Understanding: Recognise angles that are alternate and corresponding in different visual contexts.	Use of algebra when solving problems.	Unit 7.12 Basic angle facts Calculation of missing angles.	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 10				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Calculating fractions, decimals and percentages	Knowledge: Convert a percentage to a decimal. Identify use of percentage change in real life situations. Skills: Calculate a percentage of an amount using a decimal multiplier. Calculate a percentage increase or decrease using a decimal multiplier. Calculate a percentage change. To calculate the original value after it has been increased or decreased by a percentage. To solve financial problems involving simple interest. Understanding: Anticipate the outcome of an increase or decrease by a percentage in order to sense check the answer. Explain why an increase by 10% cannot be reversed by decreasing by 10%.	Identify decimal multipliers for increase and decrease percentage. Confidently explain to others where decimal multipliers come from. Understand that when you calculate the original amount, you never begin with 100%, it is always more or less depending on the percentage it has been increased or decreased by. Understand simple interest adds the same percentage of the original amount each time.	Unit 7.8 Write a quantity as a percentage of another.	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 11				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Solving equations	Knowledge: Interpret an equation and what it means to “solve” it. Identify inverse operations. Skills: To solve equations when negatives are involved. To solve equations with the variable on both sides, when the solution may be an integer, fraction or decimal, positive or negative. To recognise the point of intersection on two graphs as being the solution to both equations. Understanding: Describe why inverse operations are used to find a missing variable.	Students will be confident in the use and application of negative numbers used throughout the equation. Students will be confident to solve an equation when the variable is on the right-hand side of the equality. Students will be able to solve equations when fractions are involved in the question, and on both sides.	Unit 7.14 Solve one and two step equations, including those with brackets. Solve equations involving fractions as answers.	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 12				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Calculating Space	Knowledge: Importance of pi as a mathematical constant. Identification of parts of a circle. Relationship between radius and diameter. Formulae for area and circumference of a circle. Definition of a prism. Formula for volume of a prism. Skills: Substitution into area and circumference formulae. Substitution into volume formulae. Correct application of BIDMAS. Understanding: Adapt and apply formulae to composite shapes. Apply to problem solving e.g. revolutions of a wheel and its relationship to distance travelled.	Understand the relationship between the diameter and circumference of a circle. Calculate the area and perimeter of composite shapes. Using problem solving to find how much liquid a cylinder can hold. Multi-step problems that could involve money and the number of items you may need for an area.	Unit 7.15 Area of a rectangle, triangle, parallelogram and trapezium. Volume and surface area of a cuboid.	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 13				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Algebraic Proficiency: Visualising	Knowledge: Interpret the equation of a straight-line graph as the relationship between the x and y co-ordinates. Understand that a linear graph can represent a real-life relationship. Interpret the gradient and y-intercept of a linear graph, both positive and negative. All linear graphs can be represented by the formula $y = mx + c$ Skills: Plot a linear graph from a table of values. Calculate the gradient of a line from its graph. Identify the gradient and y-intercept from a linear equation. Sketch a linear graph give its equation. Understanding: Interpret the significance of a gradient and y-intercept in real-life scenarios.	Identify and rectify an error in a graph Create an appropriate question to match a linear graph Explain why the graphs are the shape they are and what changes them. Be able to compare different graphs and why they are different	Unit 7.7 Substitution Unit 7.16 Co-ordinates in four quadrants. Identifying the equations of vertical and horizontal lines. Unit 8.5 Manipulating expressions Substitution	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 14				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Understanding risk II	Knowledge: Set notation and definitions: intersection, union, complement Use of P(A) notation. Skills: Draw and interpret Venn diagrams to work out the probabilities of outcomes of combined events. Understanding: Identify and avoid the risk of "double-counting" when constructing a Venn diagram.	Students will be able to choose an appropriate visualisation to justify the number of possible outcomes for combined events.	Unit 7.13 Equivalence of fractions, decimals and percentages Unit 8.1 Use of Venn diagrams to identify HCF and LCM following prime factorization. Unit 8.4 Builds on probability work studied earlier in the year	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 15				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Presentation of data.	Knowledge: Identification of a scatter graph as representing the relationship between two variables. Definition of “correlation” and its types. Skills: Construct and interpret scatter graphs. Identify and describe correlation. Draw a line of best fit. Make estimates from a scatter graph. Understanding: Describe the difference between correlation and causation. Identify and explain the dangers of extrapolating outside the observed data points.	Identify anomalies in the data and explain why they could be there. Create an appropriate question to match a given answer Identify trends in the data and why they think this the case. Why would something have a relationship whereas others may not. What is the reasoning for this?	Unit 7.17 Presentation of data. Constructing graphs and plotting data.	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org

Mathematics - Year 8 Unit 16				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Measuring Data	Knowledge: How to identify and calculate the mean, median, mode and range from a list of data. Representation of discrete data in a frequency table. Representation of continuous data in a grouped frequency table. Skills: Calculate the mean, median, mode and range of discrete data in a frequency table. Identify the modal and median class from grouped data in a frequency table. Estimate the mean and range from continuous data in a grouped frequency table. Make comparisons between data sets through their measures of average and range. Understanding: Identify the suitability of each measure of average to different data sets. Describe the pros and cons of grouped data and its statistical analysis.	To know why we use different averages, what are the limitations and positives of each. Students can choose the appropriate statistics when analysing data allowing for clear judgments. Being able to spot anomalies in data and why they may be there. To solve problems involving data and come to conclusions about what has happened.	Unit 7.18 Mean, median, mode and range from a list of data.	HegartyMaths.com Mymaths.co.uk BBC Bitesize Seneca Mymaths text books 2A, 2B and 2C Transum.org