THE ABBEY SCHOOL
A BUSINESS & ENTERPRISE ACADEMY

Mathematics

Year 9 Higher
Scheme of Work

Subject leader: K Ellender

Topics by term	Topic overview for Year 9					
	Term 1	**Term 2**	**Term 3**	**Term 4**	**Term 5**	**Term 6**
Topics taught	**1H. Number** 1a. Calculations 1b. Place value and estimating 1c. HCF and LCM 1d. Powers and indices 1e. Standard form 1f. Surds Knowledge Recall / Quiz	**2H. Basic Algebra** 2a. Algebraic Indices 2b. Expanding brackets and factorising 2c. Solving Linear Equations and Inequalities 2d. Sequences 2e. Expanding and factorising quadratics 2f. Substitution and formulae Knowledge Recall/Quiz	**3H. Graphs, Tables & Charts** 3a. Statistical Diagrams 3b. Time Series 3c. Scatter Diagrams. 3d. Averages and Range Knowledge Recall/Quiz	**4H. Fractions, Ratios and Percentages** 4a. Working with Fractions 4b. Percentages 4c. Fractions, Decimals and Percentages 4d. Ratios 4e.Ratio and Proportion Knowledge Recall / Quiz	**5H. Graphs** 6a. Linear Graphs 6b. Graphs of Real Life & Rates of Change 6c. Line Segments 6d. Quadratic Graphs 6e. Cubic, Reciprocal and Other Graphs Knowledge Recall / Quiz	**6H. Angles and trigonometry** 5a. Triangles and Quadrilaterals 5b. Angles in polygons 5c. Pythagoras' Theorem 5d. Trigonometry – lengths 5e. Trigonometry – angles Knowledge Recall / Quiz

	Vital prerequisites	Vital prerequisites	Vital prerequisites	Vital prerequisites	Vital prerequisites	Vital prerequisites
	Year 8, Term 1, Topic 1 – Number Skills Students should be familiar with calculations, divisibility and division, calculating with negative integers, powers and roots, and multiples and factors.	**Year 7, Term 2, Topic 3 – Expressions, functions and formulae** **Year 8, Term 3, Topic 4 – Expressions and equations** Understanding of algebraic powers, expressions and brackets, factorising expressions, one-step equations and two-step equations. **Year 8, Term 4, Topic 5 – Real-life graphs and straight-line graphs** Students should have an understanding of linear sequences. They should be able to generate and use the nth term of a linear sequence.	**Year 7, Term 2, Topic 3 – Displaying and analysing data** Students should know how data can be displayed differently depending on the type of data. They should be able to group data and produce a line-graph/bar chart. Students should also be comfortable in calculating the mean, median, mode and range from a set of data **Year 8, Terms 1 and 2, Topic 2 – Statistics, graphs and charts** Students should have covered basic pie charts, tables, stem-and-leaf diagrams, scatter graphs and misleading graphs. Students should also be comfortable in comparing two sets of data.	**Year 8, Term 5, Topic 8 – Calculating with fractions** Students should be comfortable with ordering fractions, adding, subtracting, multiplying and dividing fractions, converting mixed numbers and calculations with mixed numbers. **Year 8, Term 6, Topic 9 – Percentages, decimals and fractions** Students should comfortable converting between fractions, decimals and percentages as well as being able to calculate a basic percentage of an amount.	**Year 7, Term 6, Topic 9 – Sequences and graphs** Students are able to correctly plot and use coordinates. They should also be introduced to basic linear graphs **Year 8, Term 3, Topic 5 – Real-life graphs and straight-line graphs** Students should be able to use conversion graphs, distance-time graphs, line graphs, real-life graphs, curved graphs, more complex straight-line graphs including negative gradients and also direct proportion involving graphs.	**Year 7, Term 5, Topic 7 – Lines and angles** Students should be able to measure and draw angles, use basic angle facts, draw triangles accurately and correctly label line segments and angles **Year 8, Term 5, Topic 7 – Lines and angles** Students are introduced to the idea of angles in parallel lines, angles in polygons, solving more complex geometric problems and constructions.
	Why are we teaching this now?	**Why are we teaching this now?**	**Why are we teaching this now?**	**Why are we teaching this now?**	**Why are we teaching this now?**	**Why are we teaching this now?**
	This unit relates to many other units and is a fundamental base for all of mathematics. **Year 11, Term 3, Chapter 17H – Further Algebra** Students need strong number skills and an understanding of indices for surds, functions and proof.	**Year 10, Term 2, Chapter 9H – Equations and Inequalities** Students need to be able to solve a quadratic equation, complete the square, solve basic simultaneous equations, solve linear and quadratic simultaneous equations and solve inequalities.	**Year 10, Term 5, Chapter 14H – Further Statistics** Students need to be able to draw and interpret cumulative frequency diagrams, box plots, histograms, use sampling methods and also estimate populations.	**Year 10, Term 3, Chapter 10H – Probability** Students need to have an understanding of FDPs in order to work effectively with probability. Students need to be able to use the product rule for outcomes including for mutually exclusive	**Year 11, Term 2, Chapter 15H – Equations and Graphs** Students need to be comfortable working with linear functions, quadratic functions, simultaneous equations, cubic functions and graphing inequalities.	**Year 10, Term 3, Chapter 12H – Similarity and Congruence** Students must understand that similar shapes have the same angles but not necessarily the same lengths whereas congruent shapes are exactly the same.

		Year 11, Term 2, Chapter 15H – Equations and graphs Students need to be comfortable working with linear functions, quadratic functions, simultaneous equations, cubic functions and graphing inequalities.		events, work with experimental probability, draw and use tree diagrams, draw and use Venn diagrams and use set notation. **Year 10, Term 4, Chapter 11H – Multiplicative reasoning** Students need to be able to use a multiplier to represent growth and decay problems. This can include compound and simple interest. Students need to work with measures and also solve problems involving direct and inverse proportion.		**Year 10, Term 1, Chapter 7H – Area and volume** Students may need to use Pythagoras or trigonometry to find a missing length in a area/volume question. **Year 11, Term 1, Chapter 13H – Further trigonometry** Students need to be able to use trigonometry with accuracy, find the area of any triangle, use the sine and cosine rule, solve problems involving 3D diagrams and trigonometry and recognise and draw trigonometric graphs.

Contents

This symbol indicates that there are aspects of this curriculum area that pupils have previously practised. Pupils will be revisiting earlier content as part of their consolidation or in order to ensure knowledge is secure before expanding into new learning. References to these earlier SOL are noted for teachers to check specific objectives and content.

Edexcel Foundation 1MA1							
Specification References	**Big questions**	**Topic area: Main Items**	**Learning Objectives /Outcomes** **All: grades 1-3** **Most: grades 6-7** **Some: grades 8-9** **Examples**	**Key Terms/ concepts** **Literacy** **Numeracy**	**Assessment and homework tasks**	**Resources**	**Personal Development Curriculum links (SMSC, British Values, PSHE)**
Term 1							
	Topic 1: Ch1 - Number (6 weeks)						
N2, N3, N5, N14, N15	How do you calculate with ANY number? Yr7, Yr8 Ch1, 6	1a. Calculations	Add, subtract, multiply and divide integers and decimals. Multiply or divide by any number between 0 and 1; Put digits in the correct place in a decimal calculation and use one calculation to find the answer to another; Revise operating with negative numbers. **Gatsby Benchmarks: Careers** Use real-life contexts with basic integer and decimal calculations wherever possible to help students to engage and relate learning to everyday and working life. Maths, Why Bother? | MYPATH Careers Resources (mypathcareersuk.com) .	Integer, number, digit, negative, decimal, addition, subtraction, multiplication, division, remainder, operation, , power, roots, estimate, integer, number, digit, negative, decimal, addition, subtraction, multiplication, division, remainder, operation, estimate, power, roots, factor, multiple, primes, square, cube, even, odd, power, standard form, simplify, index surd, rational, irrational See command words	**Starter quizzes for the term should include:** **Required prior knowledge** **Mixed skills practice** **Focused accuracy drills** **Knowledge gap support** **Look, cover, write, check.** Pupils are expected to complete purposeful exercises and repeated practice on: • The four operations, including decimals and negatives • Related calculations Practical problems involving all four operations such as cost and time calculations. Multistep problems in a range of scenarios with reasoning, where necessary. Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Number > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	• Pearson's GCSE Maths 9-1 Textbook: Ch1H · • Purposeful Practice Book Ch1H • Edexcel Higher Linear Course Text Book Ch1, 7, 26 • Common misconception information Scientific calculators Directed numbers drills - Directed Number Patterns (mathsbot.com) Key & exemplar questions – WRM - SOL topics Year 9 Term 1 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice questions and AO1/AO2/AO3 style questions for assessment.	By maintaining high standards of behaviour, including mutual respect and tolerance for different ideas to their own, class teachers will be promoting British values. Throughout the year, students should be encouraged to actively listen to understand the viewpoint of others when learning involves opinions, interpretation of fact and alternative methods **Gatsby Benchmarks: Personal Finance** Discuss the importance of Maths skills to develop and demonstrate confidence and competence in personal finance/planning. Relatable examples within the context of outcomes listed could include: Calculating with money as decimals for costs, profits and unit prices. Bank accounts and budgeting/financial planning with basic arithmetic

N2, N3, N5, N14, N15	How and why do we estimate? Yr7,Yr8 Ch6	1b. Place value and estimating	Round numbers to the nearest 10, 100, 1000; Round to integers, decimal places & significant figures; Estimate answers to one- or two-step calculations, including rounding and formal estimation to 1SF.		Pupils are expected to complete purposeful exercises and repeated practice on: • Rounding to decimal places and significant figures. • Estimating the answers to calculations by using rounding and BIDMAS. Practical problems involving all four estimating for cost and time calculations. Multistep problems in a range of scenarios with reasoning, where necessary. Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Number > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	• Pearson's GCSE Maths 9-1 Textbook: Ch1H · • Purposeful Practice Book Ch1H • Edexcel Higher Linear Course Text Book Ch1, 7, 26 • Common misconceptions Scientific calculators Year 9 Term 1 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice questions and AO1/AO2/AO3 style questions. Estimating length using scientific notation - Mathematics Assessment Project	**Gatsby Benchmarks: Personal Finance** Discuss the importance of Maths skills to develop and demonstrate confidence and competence in personal finance/planning. Relatable examples within the context of outcomes listed could include: Long term and short term savings and budgeting projections with estimating and rounding. Cost calculations with estimating,
N3, N4, N6, N7, N8, N9	How do you use primes and powers? Yr7, Yr8 Ch1	1c. HCF and LCM 1d. Powers and indices	Find the prime factor decomposition of positive integers; Find common factors and common multiples; Find the LCM and HCF of two numbers Investigate finding the LCM and HCF of two numbers by alternative methods such as listing and Venn diagrams. Solve problems using HCF and LCM, and prime numbers; LCM and HCF of three or more numbers Use index notation for powers of 10; Recognise powers of 2, 3, 4, 5; Use the square, cube and power keys on a calculator and estimate powers and roots of any given positive number.		Pupils are expected to complete purposeful exercises and repeated practice on: • Finding the HCF and LCM • Calculating using powers, roots and a mixture of both • The four operations in standard form. • Calculating using surds Practical problems in a range of real life scenarios such as timetables, packaging with the uses of multiples.	• Pearson's GCSE Maths 9-1 Textbook: Ch1H · • Purposeful Practice Book Ch1H • Edexcel Higher Linear Course Text Book Ch1, 7, 26 • Common misconception information Scientific calculators Key & exemplar questions – WRM - SOL topics	**Gatsby Benchmarks: Careers** Use real-life contexts multiple/factor calculations wherever possible to help students to engage and relate learning to everyday and working life e.g. bus routes and

		1e. Standard form 1f. Surds	Find the value of calculations using indices including positive, fractional and negative indices; Recall that $n^0 = 1$ and $n^{-1} = 1/n$ for positive integers n as well as, n^0.5 = √*n* and n^1/3 = $\sqrt[3]{n}$. Understand that the inverse of raising a number to a power *n* is raising the result to the power 1/n; Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers, fractional and negative powers, and powers of a power; Solve problems using index laws; Use brackets and the hierarchy of operations up to and including with powers and roots. Use an extended range of calculator functions, including +, –, ×, ÷, x^2, √*x*, memory, x^y, $x^{\frac{1}{y}}$, brackets; Use calculators for all calculations: positive and negative numbers, brackets, powers and roots, four operations. Convert numbers into standard form and vice versa; Add and subtract numbers in standard form; Multiply and divide numbers in standard form; **The Abbey Lens:** **Science – cellular biology, universe scales etc.** **Geography – populations, land masses etc.** Interpret a calculator display using standard form and know how to enter numbers in standard form; Understand surd notation, e.g. calculator answers Simplify surd expressions and operations Rationalising simple denominators* – NB This may be too abstract for some students here. Covered later in Ch17.		Practical problems in a range of real life scenarios involving standard form. Multistep problems involving the use of surds in calculations to highlight accuracy and the differences in error intervals when calculating with rounded values. Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Number > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	Manipulatives for prime number representations Prime Factor Tiles (mathsbot.com) Visual representation between HCF and LCM composition - Prime Factors, HCF and LCM (mathsbot.com) Year 9 Term 1 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice questions and AO1/AO2/AO3 style questions for assessment. Scale of the universe - Scale of the Universe 2 (htwins.net) World Populations - Population by Country (2021) - Worldometer (worldometers.info) How many ways can we write 1 million? - mathspad.co.uk Large and Small - ALGEBRA (nuffieldfoundation.org)	transportation planning, packaging calculations with LCM. Maths, Why Bother? | MYPATH Careers Resources (mypathcareersuk.com)
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. The problems in the textbook should be used, as well as exam style questions from the board. Further examples could include, but should not be limited to: Using the square root, fraction and index button on calculators for accuracy. Relating calculations and estimating values with reasons Standard form is used in science - lots of cross-curricular opportunities. Students need to be provided with plenty of practice in using standard form with calculators			Knowledge Recall Lesson – Unit 1 – Shared area. Pearson's KS3 Maths 9-1 Textbook: Problem solving, Check Up, Strengthen and Extend questions.	

		Knowledge Quiz	Knowledge Quiz and self-assessment.		Ch1H Knowledge Quiz – Shared area.		
Assessments for the year group will take place in Week 3 of each term, followed by feedback and focussed Pupil Improvement Time.							
Term 2							
	Topic 2: Ch2 – Basic algebra (6 weeks)						
N1, N3, A1, A2, A3, A4, A7, N8, A5, A6, A17, A20, A21 , N9, A23, A24, A25,	How can we use and interpret expressions, equations and sequences? Yr7, Yr8 Ch4	2a. Algebraic Indices 2b. Expanding brackets and factorising 2c. Solving Linear Equations	Use algebraic notation and symbols correctly; Write an expression; Manipulate an expression by collecting like terms; Substitute positive and negative numbers into expressions involving brackets and powers; Simplify expressions by cancelling, e.g. $4x/2= 2x$ Use instances of index laws for positive integer powers; Use index notation in algebraic terms; Use instances of index laws, including use of zero, fractional and negative powers; Multiply a single term over a bracket; Simplify expressions by factorising into a single bracket. Expand the product of two linear expressions, i.e. double brackets working up to negatives e.g. $(2x + 3y)(3x – y)$; Know that squaring a linear expression is the same as expanding double brackets; Factorise quadratic expressions of the form $ax^2 + bx + c$; Factorise using the difference of two squares. Understand the ≠ symbol and introduce identity ≡ sign; Know the difference between a term, expression, equation, formula and an identity; Solve linear equations, with unknown on one/both sides; Solve linear equations with brackets, including negative signs and those with a negative solution; Solve linear equations with fractional coefficients; Set up and solve linear equations to solve a problem; Simple proofs & use of ≡ in “show that” style questions; Solving linear inequalities and be able to interpret the answer as a set of values or on a number line.	term, ‘like’ terms, index, power, negative and fractional indices, expand, bracket, factor, factorise, linear, simplify, approximate, expression, identity, equation, formula, substitute, term, ‘like’ terms, arithmetic, geometric, function, sequence, *n*th term, derive expand, bracket, factor, factorise, quadratic, linear, simplify, approximate, collect, substitute, formulae, derive, in terms of, subject See command words ,	**Starter quizzes for the term should include:** **Required prior knowledge** **Mixed skills practice** **Focused accuracy drills** **Knowledge gap support** **Look, cover, write, check.** Pupils are expected to complete purposeful exercises and repeated practice on: · • Simplifying algebraic terms, often using more than one rule. • Expanding and factorising single brackets • Solving equations including those with brackets and variables on both sides • Finding the Nth term of sequences including negative and decimal sequences • Substituting into expressions and formulae • Changing the subject of a formula Practical problems in a range of real life scenarios involving the use of formula to determine unknown values. Multistep problems in a range of scenarios with reasoning, where necessary.	• Pearson’s GCSE Maths 9-1 Textbook: Ch2H · • Purposeful Practice Book Ch2H • Edexcel Higher Linear Course Text Book Ch5, 8, 10, 18 • Common misconception information Key & exemplar questions – WRM - SOL topics Year 9 Term 2 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice questions and AO1/AO2/AO3 style questions for assessment. Expanding/factorising card sort, student sheet, notes & ppt - Nuffield Foundation Describing area - mathspad.co.uk Difference of Two Squares - Median Don Steward Types of sequence puzzles - MathsPad	**Gatsby Benchmarks: Careers** Use expressions to represent real situations to help students engage and relate algebra to everyday and working life. Maths, Why Bother? | MYPATH Careers Resources (mypathcareersuk.com) **SMSC and BV** Demonstrate the use of patterns and sequences including the Fibonacci sequence and the Golden ratio within the wider world, including links to art, design and science. It is an opportunity to investigate another area of the history and discoveries within the subject at the end of term.

		2d. Sequences 2e. Revisit 2b if required.	Recognise simple sequences including odd, even, triangular, square and cube numbers, Fibonacci-type; Generate sequences of numbers, squared integers and sequences derived from diagrams; Describe in words a term-to-term sequence and identify which terms cannot be in a sequence; Generate specific terms in a sequence using the position-to-term rule and term-to-term rule; Find and use the *n*th term of an arithmetic sequence; Decide if a given number is a term in the sequence, or find the first term above or below a given number; Identify which terms cannot be in a sequence. Continue a quadratic sequence and use the *n*th term to generate terms; Find the *n*th term of quadratic sequences;* *NB Some will find nth term for quadratic sequences too abstract at this stage. Covered later in Ch17. Distinguish between arithmetic & geometric sequences. Use finite/infinite, ascending/descending descriptions. Recognise/ use geometric progressions (rn where n is an integer, and r is a rational number > 0 or a surd); Continue geometric progression and find term to term rule, including negative, fraction and decimal terms Expand the product of two brackets. Factorise quadratic expressions of the form $ax^2 + bx + c$ and factorise using the difference of two squares.		Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Algebra > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	4 in a line - Extending Sequences - MissBrookesMaths	
N1, N3, A1, A2, A3, A4, A7, N8, A5, A6, A17, A20, A21	What is a formulae and how do we use them in Science? Yr7 Ch3	2f. Substitution and formulae	Substitute numbers into linear formulae from mathematics and other subject, e.g. $l \times w$, $v = u + at$; Derive simple equations/formulae from word problems; Then solve these equations, interpreting the solution in the context of the problem; Substitute positive and negative numbers into a formula, solve the resulting equation. Use and substitute into the kinematics formulae $v = u + at$, $v^2 - u^2 = 2as$ & $s = ut + \frac{1}{2} at^2$; Change the subject of a simple formula. **USE THE SCIENCE FORMULAE SHEET. (Equation set 1)**				

			Change the subject of a formula, including cases where the subject is on both sides of the original formula, or involving fractions and small powers of the subject; **The Abbey Lens:** **Science – Formulae in physics** **Sports Science – BMI formula.**				
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. The problems in the textbook should be used, as well as exam style questions from the board. Further examples could include, but should not be limited to: Use examples involving formulae for circles, spheres, cones and kinematics when changing the subject of a formula. For substitution use the distance–time–speed formula, and include speed of light given in standard form. Students should be encouraged to use their calculator effectively by using the replay and ANS/EXE functions; Solve problems involving sequences from real life situations.			Knowledge Recall Lesson – Unit 2 – Shared area. Pearson's KS3 Maths 9-1 Textbook: Problem solving, Check Up, Strengthen and Extend questions.	
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Ch2H - Knowledge Quiz – Shared area.		
Assessments for the year group will take place in Week 3 of each term, followed by feedback and focussed Pupil Improvement Time.							
Term 3							
	Topic 3: Ch3 - Graphs, tables and charts (6 weeks)						
G14, S2, S3, S4, S5, S1, S6	How can you extend your knowledge of displaying data from year 7 and 8? Yr7, Yr8 Ch3	3a. Statistical Diagrams	Know which charts to use for different types of data sets; Produce and interpret composite bar charts; Produce and interpret comparative and dual bar charts; Produce and interpret pie charts: find the mode and the frequency represented by each sector; compare data from pie charts that represent different-sized samples; Design and use two-way tables for discrete and grouped data; Use information provided to complete a two-way table; Sort, classify and tabulate data and discrete or continuous quantitative data; Construct and interpret stem and leaf diagrams (including back-to-back diagrams): Find the mode, median, range, as well as the greatest and least values from stem and leaf diagrams, and compare two distributions from stem and leaf diagrams (mode, median, range);	Stem and leaf, frequency, table, sort, pie chart, estimate , discrete, continuous, qualitative, quantitative trend scatter graph, line of best fit, correlation, positive, negative, sample, population, mean, median, mode, range, average, discrete, continuous, qualitative, quantitative, data, See command words	**Starter quizzes for the term should include:** **Required prior knowledge** **Mixed skills practice** **Focused accuracy drills** **Knowledge gap support** **Look, cover, write, check.** Pupils are expected to complete purposeful exercises and repeated practice on: · • Expressing data in charts and tables. • Interpreting data from different charts and tables. Practical problems in a range of real-life scenarios involving the reading and	• Pearson's GCSE Maths 9-1 Textbook: Ch3H · • Purposeful Practice Book Ch3H · • Edexcel Higher Linear Course Text Book Ch3, 11, 17, 21 • Common misconception information Key & exemplar questions – WRM - SOL topics Scientific calculators Printed templates for bar charts, pie charts, etc.	**Gatsby Benchmarks: Careers** Use real-life contexts wherever possible to help students to engage and relate learning to everyday and working life, and explore representing the world in a Mathematical way. All graphical representations should be able to be given a context or career link in this unit. Maths, Why Bother? | MYPATH Careers Resources (mypathcareersuk.com)

		3b. Time Series 3c. Scatter Diagrams	Produce and interpret frequency polygons for grouped data: From frequency polygons, read off frequency values, compare distributions, calculate total population, mean, estimate greatest and least possible values (and range); Produce frequency diagrams for grouped discrete data: read off frequency values, calculate total population, find greatest and least values; Produce line graphs: read off frequency values, calculate total population, find greatest and least values; Recognise simple patterns, characteristics relationships in bar charts, line graphs and frequency polygons. **Abbey Lens:** **Geography – Tables and charts to show population increases/decreases over time.** **Business – Tables and charts to show consumer habits.** **History – Historical trends.** Construct and interpret time–series graphs, comment on trends; Draw and interpret scatter graphs; Interpret graphs as the relationship between two variables; Draw lines of best fit, understanding what these represent; Identify outliers and ignore them on scatter graphs; Use a line of best fit, to predict values of a variable given values; Distinguish between positive, negative and zero correlation using lines of best fit, and interpret correlation in context; Understand that correlation does not imply causality, and appreciate that correlation is a measure of the strength of the association between two variables and that zero correlation does not necessarily imply 'no relationship' but merely 'no linear correlation'; Explain an isolated point on a scatter graph; Use the line of best fit make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing.		interpretation of graphical information. Practical problems in a range of real life scenarios involving interpretation and limitations of each type of average. Multistep problems in a range of scenarios with reasoning, where necessary. Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Data > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	Protractors and compasses. Year 9 Term 3 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice questions and AO1/AO2/AO3 style questions for assessment. Mean from a list of data - algebra - Craig Barton via variationtheory.com Scatter Graphs True or False – MathsPad Times Series & Moving Averages - Ryan Smailes on TES Bad Pie Charts | Solutions - winatschool.org.uk	**SMSC and BV** Use recent and relevant statistical representations in the media for discussion and context. Home - Office for National Statistics (ons.gov.uk) Initial opportunities to discuss data connections to individual liberty and the rule of law. Activity 1.1 - Democracy and Law – General Elections British values maths resources **Gatsby Benchmarks: Personal Finance** Discuss the importance of Maths skills to develop and demonstrate confidence and competence in the personal financial planning. Relatable examples within the context of outcomes listed could include: Interpreting and plotting graphs in financial contexts

			Abbey Lens: **Science – Scientific data. Explore key differences in LOBF between science and Maths.**				
G14, S2, S3, S4, S5	How can you use your knowledge of averages for tables and charts? Yr7 Ch1	3d. Averages and Range	Calculate mean, range, median and mode from small data set; Use a spreadsheet to calculate mean/ range/ median / mode; Compare the averages and range of two distributions. Recognise advantages & disadvantages of average measures; Calculate the mean, mode, median and range from a frequency table (discrete data); Construct and interpret grouped frequency tables for continuous data: for grouped data, find the interval which contains the median and the modal class; Estimate the mean with grouped data; Understand that the expression 'estimate' is used, finding the mean of grouped data using mid-interval values **Abbey Lens:** **Opportunity to use 'averages' in the context of other subject areas. E.g. Scientific data, Geographical averages** Our World in Data				**SMSC and BV** Maths and the use of data have a significant role in democratic decision-making and influencing change. Students may hear statistics quoted to justify and argue for particular positions. The development of critical thinking skills using maths will help build student resilience and provides many opportunities to explore democracy and the rule of law. This may take the form of studying general or local election results, where relevant or simply just analysing the use of each 'average' to determine the advantages / disadvantages. Students should be encouraged to share and explore various opinions.
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. The problems in the textbook should be used, as well as exam style questions from the board. Further examples could include, but should not be limited to: Misleading graphs are a useful activity for covering AO2 strand 5: Critically evaluate a given way of presenting information. For time–series graphs, use examples from science, geography. NB Moving averages are not explicitly mentioned in the programme of study but may be worth covering too. A possible extension includes drawing the line of best fit through the mean point (mean of *x*, mean of *y*).			Knowledge Recall Lesson – Unit 3 – Shared area. Pearson's KS3 Maths 9-1 Textbook: Problem solving, Check Up, Strengthen and Extend questions.	
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Ch3H Knowledge Quiz – Shared area.		
Assessments for the year group will take place in Week 3 of each term, followed by feedback and focussed Pupil Improvement Time.							
Term 4							
	Topic 4: Ch4 – Fractions, ratio and percentages (6 weeks)						
N2, N3, N10 ,N12, R3	How do we perform the 4 operations with fractions?	4a. Working with Fractions	Express a given number as a fraction of another; Find equivalent fractions and compare the size of fractions; Write a fraction in its simplest form.	Addition, subtraction, multiplication, division, fractions, mixed, improper, percentage, VAT, increase,	**Starter quizzes for the term should include:** **Required prior knowledge** **Mixed skills practice** **Focused accuracy drills**	• Pearson's GCSE Maths 9-1 Textbook: Ch4H ·	**SMSC & BV** Activity 2.2– Respect and Liberty. If Britain were 100 people. (Involves FDP calculations)

	 Yr7, Y 8 Ch8		Find a fraction of a quantity, including within a context; Convert a fraction to a decimal to make a calculation easier; Convert between mixed numbers and improper fractions; Add, subtract, multiply and divide fractions; Multiply/ divide fractions, including mixed numbers. Add and subtract fractions, including mixed numbers; Understand and use unit fractions as multiplicative inverses; By writing the denominator in terms of its prime factors, decide whether fractions can be converted to recurring or terminating decimals; State the reciprocal of a number.	decrease, multiplier, profit, loss, annual recurring, reciprocal, integer, decimal, termination, ratio, proportion, share, parts, unitary, See command words.	**Knowledge gap support Look, cover, write, check.** Pupils are expected to complete purposeful exercises and repeated practice on: · • The four operations with fractions. • The four operations with mixed numbers • Finding the reciprocal of a number Practical problems in a range of real life scenarios involving fractions. Multistep problems in a range of scenarios with reasoning, where necessary. Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Number > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	• Purposeful Practice Book Ch4H • Edexcel Higher Linear Course Text Book Ch4, 7, 12, 20, 34 • Common misconception information • Key & exemplar questions – WRM - SOL topics Scientific calculators Manipulatives for fraction representations and relations to equivalents - Fraction Wall (mathsbot.com) Year 9 Term 4 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice questions and AO1/AO2/AO3 style questions for assessment. Reciprocals Odd One Out - MathsPad	.British values maths resources **Gatsby Benchmarks: Careers** Use real-life contexts with fractions wherever possible to help students to engage and relate learning to everyday and working life. Maths, Why Bother? | MYPATH Careers Resources (mypathcareersuk.com)
N8, N12, N13, R9, N2, N3, N10 ,N12, R3,	How can you use and apply your knowledge of percentages to the real world?  Yr7, Yr8 Ch10	4b. Percentages	Express a given number as a percentage of another number, including greater than 100%. Find a percentage of a quantity; Find the new amount after a percentage increase or decrease; Work out a percentage increase or decrease, including: simple interest, income tax calculations, percentage profit or loss; Compare two quantities using percentages, including a range of calculations and contexts such as those involving time or money; Find a percentage of a quantity using a multiplier;		Pupils are expected to complete purposeful exercises and repeated practice on: · • Expressing a number as a percentage of another. • Finding percentages with and without multipliers • Finding reverse percentages	• Pearson's GCSE Maths 9-1 Textbook: Ch4H · • Purposeful Practice Book Ch4H • Edexcel Higher Linear Course Text Book Ch4, 7, 12, 20, 34 • Common misconception information	**Gatsby Benchmarks: Careers** Use real-life contexts with percentages wherever possible to help students to engage and relate learning to everyday and working life. Maths, Why Bother? | MYPATH Careers Resources (mypathcareersuk.com)

		4c. Fractions, Decimals and Percentages	Use a multiplier to increase or decrease by a percentage; Find the original amount given the final amount after a percentage increase or decrease (reverse percentages), including VAT; Use calculators for reverse percentage calculations by doing an appropriate division; Use percentages in real-life situations, including percentages greater than 100%; Describe percentage increase/decrease with fractions, e.g. 150% increase means 2.5 times as big; Understand that fractions are more accurate in calculations than rounded percentage or decimal equivalents, and choose appropriately for calculations. Convert between fractions, decimals and percentages; Convert a fraction to a recurring decimal; Convert a recurring decimal to a fraction; Find the reciprocal of an integer, decimal or fraction.		• Finding compound interest • Converting between FDP including recurring. Practical problems in a range of real life scenarios involving percentages. Multistep problems in a range of scenarios with reasoning, where necessary. Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Number > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	Key & exemplar questions – WRM - SOL topics Scientific calculators Year 9 Term 4 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice questions and AO1/AO2/AO3 style questions for assessment. Compound percentages activities from Teachit Maths Recurring Decimals Four in a Row - Teachit Maths Repeating Decimals - Maths Assessment Project	**Gatsby Benchmarks: Personal Finance** Discuss the importance of Maths skills to develop and demonstrate confidence and competence in personal finance/planning. Relatable examples within the context of outcomes listed could include: Percentages – including taxation, sales, inflation, interest rates, loans. Percentage change problems including price and salary changes. Compound interest and depreciation. **SMSC & BV** Students might explore and discuss the extent of individual liberty bearing in mind legal constraints that are numerical in nature, e.g.,taxation levels, or the financial links to education choices and careers.
N11, N12, N13, R3, R4, R5, R6, R7, R8, R10	How can your ratio knowledge from year 7 and 8 help you solve problems? Yr7, Yr8 Ch6	4d. Ratios 4e.Ratio and Proportion	Express the division of a quantity into a number parts as a ratio; Write ratios in form 1 : *m* or *m* : 1 and to describe a situation; Write ratios in their simplest form, including three-part ratios; Divide a given quantity into two or more parts in a given part : part or part : whole ratio; Use a ratio to find one quantity when the other is known; Write a ratio as a fraction; Write a ratio as a linear function;		Pupils are expected to complete purposeful exercises and repeated practice on: · • Dividing into a ratio • Expressing a ratio in the form 1:n or n:1 • Using ratio and proportion in real life (E.g. recipes and currency conversion).	• Pearson's GCSE Maths 9-1 Textbook: Ch4H · • Purposeful Practice Book Ch4H • Edexcel Higher Linear Course Text Book Ch4, 7, 12, 20, 34 • Common misconception information	**Gatsby Benchmarks: Personal Finance** Discuss the importance of Maths skills to develop and demonstrate confidence and competence in personal finance/planning. Relatable examples within the context of outcomes listed could include: 50:30:20 rule of budgeting.

			Identify direct proportion from a table of values, by comparing ratios of values; Use a ratio to compare a scale model to real-life object; Use a ratio to convert between measures and currencies, e.g. £1.00 = €1.36; Scale up recipes; Convert between currencies. **Abbey Lens:** **Business – Converting currencies and economies of scale (best buys)** **Geography – Countries and cities**		Multistep problems in a range of scenarios with reasoning, where necessary. Practical problems in a range of real life scenarios involving ratios. Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Number > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	Key & exemplar questions – WRM - SOL topics Scientific calculators Manipulatives for fraction representations and relations to equivalents - Fraction Wall (mathsbot.com) Ratio 'bar method' manipulatives - Bar Modelling (mathsbot.com) Ratio shares manipulatives - Sharing in a ratio (mathsbot.com) Year 9 Term 4 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice questions and AO1/AO2/AO3 style questions for assessment. Write ratio in the form n:1 (answers) - @taylorda01	Best buy problems with multiples or unitary costs. Currency Conversions – including graphs. Use currency conversion graphs in contexts to explore and expose students to global currencies and the idea of exchange rates. Currency Converter - Foreign Exchange Rates Calculator | Xe
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. The problems in the textbook should be used, as well as exam style questions from the board. Further examples could include, but should not be limited to: Comparing prices of items in different currencies Looking at the language of ratio problems to decide which method is required. Percentage increase and decrease in context. Language of standard and reverse percentage questions. Banking calculations. Ratio and fraction quantities of geometric shapes.			Knowledge Recall Lesson – Unit 4 – Shared area. Pearson's KS3 Maths 9-1 Textbook: Problem solving, Check Up, Strengthen and Extend questions.	
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Ch4H Knowledge Quiz – Shared area.		

Assessments for the year group will take place in Week 3 of each term, followed by feedback and focussed Pupil Improvement Time.							
Term 5							
	Topic 5: Ch6 – Graphs (6 weeks)						
N13, N15, A8, A10, A14, A15, R1, R11 A9, A12, A17, R8, R10	How do you plot, use and interpret a linear graph? Yr7, Yr8 Ch9	6a. Linear Graphs 6b. Graphs of Real Life & Rates of Change	Identify and plot points in all four quadrants; Plot and draw graphs of y = a, x = a, y = x and y = –x. Identify and interpret the gradient of a line segment; Recognise that equations of the form y = mx + c correspond to straight-line graphs in the coordinate plane; Identify and interpret the gradient and y-intercept of a linear graph given by equations of the form y = mx + c; Find the equation from a graph in the form y = mx+c; Plot and draw graphs of straight lines of the form y = mx + c with and without a table of values; Sketch a graph of a linear function, using the gradient and y-intercept (i.e. without a table of values); Find the equation of the line through one point with a given gradient; Identify and interpret gradient from an equation ax + by = c; Rearrange the equation of a graph in the form ax+by=c; Plot and draw graphs of straight lines in the form ax + by = c; Interpret & analyse information presented as linear graphs: -use gradients to interpret how variables changes in relation; -find approximate solutions to a linear equation from a graph; -identify direct proportion from a graph; -find the equation of a line of best fit (scatter graphs) to model the relationship between quantities; Explore the gradients of parallel lines and lines perpendicular to each other; Interpret and analyse a straight-line graph and generate equations of lines parallel and perpendicular to the given line; Use the fact that when y = mx + c is the equation, then the gradient of a line parallel will have a gradient of m and a line perpendicular to this line will have a gradient of 1/m.	Coordinate, axes, 3D, graph, speed, distance, time, velocity, quadratic, solution, root, function, linear, approximate, gradient, perpendicular, parallel, equation graph, speed, distance, time, velocity, solution, linear, approximate, gradient, coordinate, Pythagoras, axes, gradient, perpendicular, parallel, equation, quadratic, solution, root, function, linear, circle, radius, centre, reciprocal, cubic, See command words	**Starter quizzes for the term should include:** **Required prior knowledge** **Mixed skills practice** **Focused accuracy drills** **Knowledge gap support** **Look, cover, write, check.** Pupils are expected to complete purposeful exercises and repeated practice on: · • Drawing linear graphs • Finding the equations of graphs in the form y=mx+c • Find midpoints, gradients, parallel graphs and perpendicular graphs Multistep problems in a range of scenarios with reasoning, where necessary. Practical problems in a range of real-life scenarios involving linear graph representation. Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ >Algebra > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	• Pearson's GCSE Maths 9-1 Textbook: Ch6H · • Purposeful Practice Book Ch6H • Edexcel Higher Linear Course Text Book Ch13, 23, 25 • Common misconception information Key & exemplar questions – WRM - SOL topics Scientific calculators Printed axes for graph plotting GeoGebra – Graph the line Graph the Line – GeoGebra Desmos Graphing Calculator - Desmos | Graphing Calculator Year 9 Term 5 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice questions and AO1/AO2/AO3 style questions for assessment.	**Gatsby Benchmarks: Personal Finance** Discuss the importance of Maths skills to develop and demonstrate confidence and competence in personal finance/planning. Relatable examples within the context of outcomes listed could include: Interpreting graphs is a financial context - bills, currency conversions, unit prices.

		6c. Line Segments	Draw and interpret straight-line graphs for real-life situations, including ready reckoner graphs, conversion graphs, fuel bills, fixed charge and cost per item; Draw distance–time and velocity–time graphs; Use graphs to calculate various measures (of individual sections), including: unit price (gradient), average speed, distance, time, acceleration; including using enclosed areas by counting squares or using areas of trapezia, rectangles and triangles; Find the coordinates of the midpoint of a line segment with a diagram given or coordinates; Find the coordinates of points identified by geometrical information. Find the equation of the line through two given points. Line Segment length covered in Ch5.			Straight Line Graphs in Desmos – Resourceaholic True/false activity - rogradymaths.blogspot.co.uk	
A11, A12, A16	How do you plot, use and interpret a non-linear graph? Yr8 Ch9	6d. Quadratic Graphs 6e. Cubic, Reciprocal and Other Graphs	Generate points and plot graphs of simple quadratic functions, then more general quadratic functions; Find approximate solutions of a quadratic equation from the graph of the corresponding quadratic function; Interpret graphs of quadratic functions from real-life problems; Recognise a linear, quadratic, cubic, reciprocal and circle graph from its shape; Draw graphs of simple cubic functions using tables of values; Interpret graphs of simple cubic functions, including finding solutions to cubic equations; Draw graphs of the reciprocal function y = 1/x, x≠0 Draw circles, centre the origin, equation x2 + y2 = r2.		Pupils are expected to complete purposeful exercises and repeated practice on: · • Plot quadratic, cubic, reciprocal and circle graphs. • Interpret from these graphs by finding solutions and turning points Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Algebra> skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	• Pearson's GCSE Maths 9-1 Textbook: Ch6H · • Purposeful Practice Book Ch6H • Edexcel Higher Linear Course Text Book Ch13, 23, 25 • Common misconception information Key & exemplar questions – WRM - SOL topics Scientific calculators Printed axes for graph plotting Year 9 Term 5 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice questions and	

						AO1/AO2/AO3 style questions for assessment. Sketching quadratics – Resourceaholic	
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. The problems in the textbook should be used, as well as exam style questions from the board. Further examples could include, but should not be limited to: Use lots of practical examples to help model the quadratic function, e.g. draw a graph to model the trajectory of a projectile and predict when/where it will land. Use of various measures in the distance–time and velocity–time graphs, including miles, kilometres, seconds, and hours, and include large numbers in standard form. Knowledge Quiz – Shared area.			Knowledge Recall Lesson – Unit 6 – Shared area. Pearson's KS3 Maths 9-1 Textbook: Problem solving, Check Up, Strengthen and Extend questions.	
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Ch6 Knowledge Quiz – Shared area.		
Assessments for the year group will take place in Week 3 of each term, followed by feedback and focussed Pupil Improvement Time.							
Term 6							
	Topic 6: Ch5 – Angles and trigonometry (6 weeks)						
G1, G3, G4, G6, G11	How do you calculate any angle and justify your answer? Yr7, Yr8 Ch7	5a. Triangles and Quadrilaterals 5b. Angles in polygons	Classify quadrilaterals by their geometric properties and distinguish between scalene, isosceles,equilateral triangles; Understand the proof that the angle sum of a triangle is 180°, and derive and use the sum of angles in a triangle; Use symmetry property of an isosceles triangle to show that base angles are equal; Find missing angles in a triangle using the angle sum in a triangle AND the properties of an isosceles triangle; Understand a proof of, and use the fact that, the exterior angle of a triangle is equal to the sum of the interior angles at the other two vertices; Explain why the angle sum of a quadrilateral is 360°; Understand and use the angle properties of quadrilaterals and the fact that the angle sum of a quadrilateral is 360°; Understand and use the angle properties of parallel lines and find missing angles using the properties of corresponding and alternate angles, giving reasons; Understand 'regular' and 'irregular' as applied to polygons; Use the angle sums of irregular polygons; Calculate and use the sums of the interior angles of	Quadrilateral, angle, symmetry, parallel, corresponding, alternate, co-interior, vertices, edge, face, sides, polygon, interior, exterior, proof, tessellation, sum, Pythagoras' Theorem, trigonometry, opposite, hypotenuse, adjacent, length ratio, elevation, depression, segment, length	**Starter quizzes for the term should include:** **Required prior knowledge** **Mixed skills practice** **Focused accuracy drills** **Knowledge gap support** **Look, cover, write, check.** Pupils are expected to complete purposeful exercises and repeated practice on: · • Finding missing angles in polygons (interior and exterior) • Giving reasons for answers and each stage of working out. • Multistep problems in a range of scenarios with reasoning, where necessary. ·	• Pearson's GCSE Maths 9-1 Textbook: Ch5H • Purposeful Practice Book Ch5H • Edexcel Higher Linear Course Text Book Ch2, 19 • Common misconception information Key & exemplar questions – WRM - SOL topics Scientific calculators Year 9 Term 6 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice	

			polygons. Use the sum of the exterior angles of any polygon is 360°; Use the sum of the interior angles of an n-sided polygon; Use the sum of the interior and exterior angle is 180°; Find the size of each interior angle, or the size of each exterior angle, or the number of sides of a regular polygon, and use the sum of angles of irregular polygons; Calculate the angles of regular polygons and use these to solve problems; Use the side/angle properties of compound shapes made up of triangles, lines and quadrilaterals, including solving angle and symmetry problems for shapes in the first quadrant, more complex problems and using algebra; Use angle facts to demonstrate how shapes would 'fit together', and work out interior angles of shapes in a pattern.		Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ >Geometry > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	questions and AO1/AO2/AO3 style questions for assessment. Let's draw some diagrams - Teachit Maths	
A4, N7, N8, N15, G6, G20, G21	How do we calculate sides and angles from right angled triangles?	5c. Pythagoras' Theorem 5d. Trigonometry – lengths 5e. Trigonometry - angles	Understand, recall and use Pythagoras' Theorem in 2D; Given three sides of a triangle, justify if it is right-angled; Calculate the length of the hypotenuse in a right-angled triangle (including decimal lengths and a range of units); Find the length of a shorter side in a right-angled triangle; Calculate the length of a line segment AB given pairs of points; Give an answer to the use of Pythagoras' Theorem in surd form; Understand, use and recall the trigonometric ratios sine, cosine and tan, and apply them to find angles and lengths in general triangles in 2D figures; Use the trigonometric ratios to solve 2D problems; Understand, use and recall the trigonometric ratios sine, cosine and tan, and apply them to find angles and lengths in general triangles in 2D figures; Use the trigonometric ratios to solve 2D problems; Find angles of elevation and depression;		Pupils are expected to complete purposeful exercises and repeated practice on: · • Finding missing lengths using Pythagoras • Finding missing sides and angles using trigonometry • Using exact trig values to solve problems Multistep problems in a range of scenarios with reasoning, where necessary. Practical problems in a range of real-life scenarios involving geometrical calculations – with a strong link to careers. Plenary style questions –	• Pearson's GCSE Maths 9-1 Textbook: Ch5H • Purposeful Practice Book Ch5H • Edexcel Higher Linear Course Text Book Ch2, 19 • Common misconception information Key & exemplar questions – WRM - SOL topics Scientific calculators Year 9 Term 6 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice questions and	**SMSC & BV** Pythagroas' Theorem is an opportunity to discuss the cultural influence of mathematics on ancient societies and the varied contributions of other cultures to modern mathematics from an historical perspective. BBC - Historic Figures: Pythagoras Pythagoras (st-andrews.ac.uk) **Gatsby Benchmarks: Careers** Use real-life contexts once knowledge is secure to help students to engage and relate learning to everyday and working life. E.g. Engineering,

			Know the exact values of sin θ and cos θ for θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60°.* *NB This may be too abstract for some students at this stage. Covered later in Ch13.		White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Geometry > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	AO1/AO2/AO3 style questions for assessment. Trigonometry Pile Up 1 & Trigonometry Pile Up 2 - Great Maths Teaching Ideas Pirate Trigonometry - Matthew Kennedy on TES Let's draw some diagrams - Teachit Maths *You Tube video for exact angles hand trick! Exact Trig Values - Hand Trick | Trigonometry | Maths | FuseSchool - YouTube	architecture, design processes. Maths, Why Bother? | MYPATH Careers Resources (mypathcareersuk.com)
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. The problems in the textbook should be used, as well as exam style questions from the board. Further examples could include, but should not be limited to: Students must be encouraged to use geometrical language appropriately, 'quote' the appropriate reasons for angle calculations and show step-by-step deduction when solving multi-step problems. Justify when to use Pythagoras' Theorem and when to use trigonometry. Use Pythagoras' Theorem and trigonometry together			Knowledge Recall Lesson – Unit 5 – Shared area. Pearson's KS3 Maths 9-1 Textbook: Problem solving, Check Up, Strengthen and Extend questions.	
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Ch5H Knowledge Quiz – Shared area.		
Assessments for the year group will take place in Week 3 of each term, followed by feedback and focussed Pupil Improvement Time.							

Use of Big Questions and Lesson Questions

Please refer to the department document on using Big Questions as part of The Abbey Lesson – "What does an Abbey Lesson look like in Maths?".

Big Questions are designed to build upon pupils' prior knowledge and link topics across KS2, 3 and 4. Big Questions will connect a series of learning outcomes, as opposed to focussing on individual objectives. All students, regardless of ability will be exposed to the same knowledge within reason, but able to explore Mathematical concepts to varying depths and wider applications. The spectrum of the Big Question focus allows for this to happen. This is where Lesson Questions are used to tailor the approach, level of detail and depth of knowledge to suit the ability, attainment, and confidence of individual classes.

Common Misconceptions Notes

Ch1H

Significant figure and decimal place rounding are often confused.
Some pupils may think 35 934 = 36 to two significant figures.
The order of operations is often not applied correctly when squaring negative numbers, and many calculators will reinforce this misconception.
1 is a prime number.
Particular emphasis should be made on the definition of "product" as multiplication, as many students get confused and think it relates to addition.
Some students may think that any number multiplied by a power of ten qualifies as a number written in standard form.
When rounding to significant figures some students may think, for example, that 6729 rounded to one significant figure is 7.

Ch2H

When expanding two linear expressions, poor number skills involving negatives and times tables will become evident.
Hierarchy of operations applied in the wrong order when changing the subject of a formula.
$a^0 = 0$.
$3xy$ and $5yx$ are different "types of term" and cannot be "collected" when simplifying expressions.
The square and cube operations on a calculator may not be similar on all makes.
Not using brackets with negative numbers on a calculator.
Not writing down all the digits on the display.
Students struggle to relate the position of the term to "n".

Ch3H

Students often forget the difference between continuous and discrete data.
Often the $\sum(m \times f)$ is divided by the number of classes rather than $\sum f$ when estimating the mean.
Students often forget the difference between continuous and discrete data.
Lines of best fit are often forgotten, but correct answers still obtained by sight.

Ch4H

The larger the denominator, the larger the fraction
Incorrect links between fractions and decimals, such as thinking that 1/5 = 0.15, 5% = 0.5, 4% = 0.4, etc.
It is not possible to have a percentage greater than 100%.

Ch6H

Where line segments cross the y-axis, finding midpoints and lengths of segments is particularly challenging, as students have to deal with negative numbers.
Students can find visualisation of a question difficult, especially when dealing with gradients resulting from negative coordinates.
Students struggle with the concept of solutions and what they represent in concrete terms

Ch5H

Some students will think that all trapezia are isosceles, or a square is only square if 'horizontal', or a 'non-horizontal' square is called a diamond.
Pupils may believe, incorrectly, that perpendicular lines have to be horizontal/vertical, all triangles have rotational symmetry of order 3 and all polygons are regular.
Incorrectly identifying the 'base angles' (i.e. the equal angles) of an isosceles triangle when not drawn horizontally.
Answers may be displayed on a calculator in surd form.
Students forget to square root their final answer, or round their answer prematurely

GCSE – Command Words

Please note that this table is not exhaustive but uses the most commonly used command words. These should be highlighted, explained and demonstrated when giving out problem solving work and GCSE questions.

Command word	**Comments**
Write down... Write...	No working will be needed
Find...	Some working will be needed but will be minimal
Work out...	Used interchangeably with 'calculate', it will be necessary to do some working out
Calculate...	Used interchangeably with 'work out' but use of 'calculate' suggests that a calculator will be needed, it will be necessary to do some workings.
Explain...	Explanation needed – may be a sentence or could be a mathematical statement
Give a reason...	Clear reasons needed; if geometrical reasons then must link into working
Draw...	Implies accuracy is important
Sketch...	Less formal than 'draw'...(no accurate measurements needed)
Complete...	Usually means that some values need filling in, for example, on a probability tree diagram or a table of values
Show...	All working needed to get to the required answer must be shown
Prove...	More formal than 'show', all steps must be present and, in the case of a geometrical proof, reasons must be given
Prove algebraically...	Algebra must be used in the proof
Describe...	Words needed to describe, for example, a transformation
Justify...	Show all working or give a written explanation
Expand...	Remove brackets
Expand and simplify...	Remove brackets and simplify
Factorise...	Straight forward factorisation
Factorise fully...	More complex factorisation, more than one factor to consider
Simplify...	Simplify the given expression
Simplify fully....	Likely to be more than one stage needed to simplify expression
Solve...	Solve an equation / inequality

General Resources Bank

Teachers will select the resources required for individual lessons. These will be fit for purpose for their class in order to promote the best progress and understanding for individual objectives, whilst still working towards the Big Question.

A **sample** list of resource materials is given as a starting point or for new ideas and are used by the department:

- Pearson's Edexcel 9-1 Textbook Series 1 and 2 - ActiveLearn (pearsonactivelearn.com)
- Pearson's Purposeful Practice book - ActiveLearn (pearsonactivelearn.com)
- MathsBox - Mathsbox
  - A wide-ranging selection of mixed quizzes, repeated practice and differentiated questions for use in the classroom, including short term cover work.
- MathsBot - MathsBot.com - Tools for Maths Teachers
  - Interactive tools and activites to aid the teaching of mathematics. Hundreds of randomly generated questions and answers and Mathematics Manipulatives for mastery.
- Corbett maths Corbettmaths – Videos, worksheets, 5-a-day and much more
  - Video tutorials, questions, revision resources and puzzles.
- Maths 4 Everyone - Maths Worksheets [Primary and Secondary] (maths4everyone.com)
  - Carefully thought-out questions that are designed for the different stages of learning a topic. Typically, there is one sheet that focuses on the First Steps, and then other sheets that contain questions which help students to Strengthen and then Extend their understanding.
- Go Teach Maths - Go Teach Maths: 1000s of free resources
  - Animated PowerPoint slides to demonstrate a mathematical method within lessons and supporting activities with an individual or paired consolidation focus.
- Maths Genie – Maths Genie • Learn GCSE Maths for Free
  - GCSE revision videos, exam style questions and solutions.
- Oak Academy - Oak National Academy (thenational.academy)
  - Online lessons and resources to support independent study – particularly useful for students who are having to spend significant amounts of time outside of the classroom.
- Mr Barton – Variation Theory - Variation Theory
  - A collection of high-quality, sequences of questions and examples using key principles from Variation Theory. Holds questions and examples constant, together with the mathematical behaviour of *reflect, expect, check, explain*.
- Dr Frost Maths - DrFrostMaths.com
  - A diverse set of free teaching resources and tools including downloadable teaching slides/worksheets for KS3-5, teaching videos and an online platform for whiteboard practice and exam questions.
- Edexcel Exam Wizard- ExamWizard :: Index
  - ExamWizard is a free exam preparation tool containing a bank of past Edexcel exam questions, mark schemes and examiners' reports for a range of GCSE subjects.

- Additional Maths Blogs and other online resources include:

Solvemymaths
Resouraholic
Colleenyoung.wordpress
missquinnmaths.wordpress
Just Maths
Mathed Up
Boss Maths
SavemyExams
Nrich

Pret Homework
BBC Bitesize
GCSE POD

Assessments/ Quizzes / Walking Talking Mocks / Pre-Public Examinations

Through the GCSE syllabus, pupils are assessed regularly to monitor progress, understanding and make predictions.

- **Formal Graded Assessments**

Formal assessments will occur once a term, during week 3 for monitoring purposes and formal feedback. It will be a mixed topic assessment to mimic the mixed topics they will need to answer for their end of year and public examinations. It is to support a more active attitude to revision in small, manageable tasks, as well as allowing students to revisit topics in a formal setting and identify gaps in knowledge.

- **Topic Quizzes**

Other assessment will be end of unit quizzes to assess recent learning and conducted when learning of that sequence is concluded.

For an improved response to revision and independent study, students are expected to undertake guided revision tasks through the year before assessments as part of their homework. Staff will support students with effective techniques and resources offered where required. These revision homework tasks will consist of:

- *Directions to important online videos and tasks to consolidate knowledge or expose students to a higher-level task or topic.*
- *Pre-prepared practice questions on the relevant topics, such as the Active Learn assessment materials and Hegarty Maths.*
- *GCSEPOD with videos and related questions.*

- **Walking, Talking Mocks**

Year 11 will have a Walking Talking Mock as a method of revisiting public exam formats and good exam technique. During the WTM, the teacher will model an approach to questions on an examination paper and guide students to complete it, with a large focus on areas that students struggle with and/or do not perform their best. Dates TBC following the publication of the exam schedule.

- **End of Year Assessments**

GCSE Public Examinations – dates to follow.

Consolidation and Review Activities

As part of each chapter of work, the students will need to undertake consolidation and review activities of their learning before moving on to new topics. This will be done as a Knowledge Recall activity.

This should consist of the following:

a. Revisiting the Big Questions, answered with new knowledge and connections reinforced. The focus here is on questioning of students and consolidation the sequences of lessons from the chapter.

b. Problem solving / literacy based questions with emphasis placed on highlighting key words and data, before undertaking problems as a sequence of steps. This is only if appropriate for the topic and required as additional work to lesson content.

c. Depending out the outcome of the Knowledge Recall, students can be directed on to either the strengthen exercise for any gaps in understanding or the extension activity work.

A topic quiz will then be set to assess understanding.

Starter activities should include topics identified in PIT from earlier assessments, as well as a constant revision of previous topics for assessment for learning.

Homework

Mathematics homework is designed and set to promote students' understanding and their ability to use mathematics in a variety of situations.

Homework should be set once per week and consist of:

- Online homework through Hegarty Maths *Trial beginning in September 2021.
- Preparation and Revision for assessments and quizzes, with particular reference to the Knowledge Organisers.
- Written homework when the teacher feels it is necessary or beneficial
- Past paper practice
- Research or Investigative Tasks.

It is expected that KS4 students will undertake a minimum of 45 minutes homework per week.

All students are given individual logins to a variety of virtual learning environments, which give them access to video tutorials, practice questions and answers. The main programmes being used are: Hegarty Maths, GCSE POD, Active Learn

For the majority of the time, homework will support in-class learning and reinforce topics that students have studied recently within the classroom.

If students fail to complete homework, staff will follow procedures outlined in the Behaviour Policy.

SMSC/ ICT/ Cross Curricular Connections

The programme of study is designed to encourage the development of wider problem solving as the mathematical knowledge of the student advances. Students must look for action points and next steps that are not explicit, in order to solve increasingly complex problems.

Lessons should :

- Value listening and respecting the viewpoint of others in problem solving.
- Promote the discussion of mathematical understanding and challenge assumption.
- Support students to question information and data that they are presented with.
- Discourage jumping to conclusions.
- Seek opportunities to build self-confidence.
- Include questions chosen based on prior lack of confidence,
- Encourage collaborative learning in the classroom – in the form of listening and learning from each other and paired discussion.
- Develop powers of logic, reasoning and explanation.
- Build competence – every student is good at something, and students struggle when connections between their strengths are not obvious or of a clear use.
- Allow choices to promote self-determination, and deal with the consequences, however minor. Giving authentic (not false) choices doesn't have to be complex—for example, choices around how to complete a multi-step problem.

Staff will seek out opportunities to encourage these values within individual lessons.

Staff should also seek out opportunities to link learning to other subjects as part of the ongoing cross -curricular cohesion project. This is ongoing but some existing links are referred to in this document as examples. By maintaining high standards of behaviour, including mutual respect and tolerance for different faiths and beliefs and encouraging learners to respect the protected characteristics, class teachers will be promoting British values. Specific examples relating to the British Values are detailed in certain chapters.