THE ABBEY SCHOOL
A BUSINESS & ENTERPRISE ACADEMY

Mathematics

Year 11 Foundation
Scheme of Learning 2023 - 2024

Subject leader: K Ellender

Topics by term	Topic overview for Year 11					
	Term 1	**Term 2**	**Term 3**	**Term 4**	**Term 5**	**Term 6**
Topics taught	**18F - Fractions, Indices and Standard Form** 18.a Operations with mixed fractions 18.b Reciprocals 18.c Index Laws 18.d Writing standard form. 18.e Operations. Knowledge Recall and Quiz **12F – Revision of Right Angled Triangles** Revision of unit knowledge and application from year 10. SOL chapter included for reference.	**16F – Quadratic Equations** 16.a Revisit Prior Algebra Knowledge 16.b Expanding Quadratics 16.c Factorising Quadratics 16.d Quadratic graphs 16.e Solving Quadratics Knowledge Recall and Quiz **10F and 14F – Revision of Percentages and Multiplicative Reasoning** Revision of unit knowledge and application from year 10. SOL chapter included for reference.	**17F – Perimeter, Area and Volume 2** 17.a Revisit Area and Volume 1 17.b Circle Vocabulary & Pi 17.c Circle Formulae 17.d Composite shapes & sectors 17.e Volume and surface area 17.f Pyramids, Cones, Spheres 19.a. Similar shapes 19.b. Congruent Triangles Knowledge Recall and Quiz **Mock Examinations**	**20F Further Algebra** 20.a Revisiting linear graph 20.b Cubic & reciprocal graphs 20.c Non-linear graphs 20.d Simultaneous equations 20.e Changing the subject 20.f Mathematical Argument Knowledge Recall and Quiz	End of Year Revision and Exams	End of Year Revision and Exams

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 4-5** **Examples**	**Key Terms/ concepts Literacy Numeracy**	**Assessment and homework tasks**	**Resources**	**Personal Development Curriculum links (SMSC, British Values, PSHE)**
Term 1							
	Topic 1: 18F - Fractions, Indices and Standard Form (4 weeks)						
N2, N3	How can we apply fraction knowledge to mixed numbers? Yr7/8 & Yr9 Ch4	18.a Operations with mixed fractions	**Students who require additional support at this stage may find it useful to firstly revisit:** • **Simplifying fractions (Unit 4F)** • **Fractions of amounts (Unit 4F)** • **Converting with mixed numbers (Unit 4F)** Revision of the four operations with fractions. Add and subtract mixed number fractions; Multiply mixed number fractions; Divide mixed numbers by whole numbers and vice versa;	Add, subtract, multiply, divide, mixed, improper, integer, fraction, decimal, power, reciprocal, index, indices, 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: • Fraction operations including mixed numbers. • Converting mixed fractions Practical problems of fraction operations. 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	• Pearson's GCSE Maths F 9-1 Textbook: Ch18 • Purposeful Practice Book Ch18F • Edexcel Higher Linear Course Text Book Ch4 • Common misconception information. Manipulatives for mixed number representations and relations to improper fractions - Fraction Wall (mathsbot.com) Year 11 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: 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) - Fractions

					Mathsbox > Topic resources > 4 Questions / Exit tickets		
N7, N9	What is standard form (and how does it relate to index notation)?  Yr9 Ch1	18.b Reciprocals 18.c Index Laws 18.d Writing standard form. 18.e Operations.	**Students who require additional support at this stage may find it useful to firstly revisit:** • **Index notation (Unit 1F)** • **Place value (Unit 1F)** Find the reciprocal of an integer, decimal or fraction; Understand 'reciprocal' as multiplicative inverse. Understand that any non-zero number multiplied by its reciprocal is 1. Understand that zero has no reciprocal because division by zero is not defined. Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers, fractions and powers of a power; Use numbers raised to the power zero, including the zero power of 10; Convert large and small numbers into standard form and vice versa; Understand where standard form is used in real life. **The Abbey Lens:** **Science – cellular biology, universe scales etc.** **Geography – populations, landmark dimensions etc.** Interpret a calculator display using standard form and know how to enter numbers in standard form. Add and subtract numbers in standard form; Multiply and divide numbers in standard form;		Pupils are expected to complete purposeful exercises and repeated practice on: • Index Laws • Converting to/from standard form • Standard form calculations with and without a calculator. Practical problems involving standard form calculations. Multistep problems in a range of scenarios with reasoning, where necessary. Key & exemplar questions – WRM - SOL topics 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 F 9-1 Textbook: Ch18 • Purposeful Practice Book Ch18F • Edexcel Higher Linear Course Text Book Ch5 and 26 • Common misconception information Scientific calculators. 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) Year 11 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 questions for practice and assessment.	
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. Worded problems should be used, as well as exam style questions from the board.			Knowledge Recall Lesson – Unit 18F – Shared area.	

			Further examples could include, but should not be limited to: Standard form use in science and there are lots of cross-curricular opportunities for contextual questions. Combined index laws. Familiarisation of command words.			Pearson's GCSE Maths F 9-1 Textbook: Problem solving, Check Up, Strengthen and Extend questions.	
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Ch18F 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.							
	Topic 2: 12F – Revision - Right Angled Triangles (2 weeks)						
N7, N15, A4, G6, G20, G21	How do we calculate sides and angles for (right angle) triangles?	12.a Pythagoras' theorem 12.b Trigonometric ratios 12.c Exact angles 12.d Trigonometry; problems	**Students who require additional support at this stage may find it useful to firstly revisit:** • **Triangle properties (Unit 6F)** • **Calculating missing angles in triangles, quadrilaterals, lines and points. (Unit 6F)** • **Square numbers (Unit 1F)** Understand, recall and use Pythagoras' Theorem in 2D, including leaving answers in surd form; Apply Pythagoras' Theorem with a triangle drawn on a coordinate grid; Given 3 sides of a triangle, justify if it is right-angled or not; Calculate the length of a line segment AB given pairs of points; 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; Round answers to appropriate degree of accuracy, either to a given number of significant figures or decimal places, or make a sensible decision on rounding in context of question; Find angles of elevation and depression; 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° Determine if a problem requires the use of Pythagoras' Theorem or Trigonometric ratios and the indications of when to use each method.	Hypotenuse, scalene, isosceles, equilateral, triangle, square, ratio, sine, cosine, tangent, Pythagoras, segment, degrees, 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: • Pythagoras' Theorem • Trigonometric angles • Trigonometric lengths • Angles of elevation and depression • Mixed problems • Exact angle recognition and recall • Calculations with exact answers. Practical problems involving Pythagoras' Theorem and Trigonometry.	• Pearson's GCSE Maths F 9-1 Textbook: Ch12 • Purposeful Practice Book Ch12F • Edexcel Higher Linear Course Text Book Ch19 • Edexcel Foundation Linear Course Text Book Ch31 • Common misconception information Pythagoras visualisation - Pythagorean theorem water demo - YouTube Pythagorean stacks (equationfreak.blogspot.com) Pythagoras and surd form (Median Don Steward). How many ways can we write 1 million? - mathspad.co.uk Large and Small - Nuffield Foundation Year 11 Term 1 Knowledge Organiser for key terms, recall and low stakes quizzing.	**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 wherever possible to help students to engage and relate learning to everyday and working life. E.g. Design and construction applications, Electrical appliance dimension design. Golden_Gate_Trig.pdf (thechalkface.net) Maths, Why Bother? | MYPATH Careers Resources (mypathcareersuk.com)

					Multistep problems in a range of scenarios with reasoning, where necessary. Key & exemplar questions – WRM - SOL topics Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Geometry > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	Please see the Resources section for available materials on practice questions and AO1/AO2/AO3 questions for practice and assessment.	
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. Worded problems should be used, as well as exam style questions from the board. Further examples could include, but should not be limited to: Pythagoras' Theorem in monetary calculations, using Pythagoras' Theorem and trigonometry together, with the introduction of bearings, drawings to be used to display information, proof of exact values.			Knowledge Recall Lesson – Unit 12F – Shared area. Pearson's GCSE Maths F 9-1 Textbook: Problem solving, Check Up, Strengthen and Extend questions.	
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Ch12F 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 3: 16F - Quadratic Equations and Graphs (4 weeks)						
	What existing knowledge do I need to revisit to extend my algebra skills? Yr7/8 & Yr9 Ch2, 5	16.a Revision of existing algebra knowledge (Unit 2F, 5F)	**Planned Consolidation** Simplifying expressions Solving mixed linear equations Index laws within algebra Substituting into algebra	**Students who require additional support at this stage may find it useful spend an extended period of time on these revision areas, when compared to others.**		See Ch2F, 5F,	
A4, A11,	How do I 'expand' in algebra (and use this	16.b Expanding Quadratics	Expanding / factorising single brackets - revision Define a 'quadratic' expression;	Term, quadratic, function,	**Starter quizzes for the term should include:**	• Pearson's GCSE Maths F 9-1 Textbook: Ch16	•

	to form quadratic expressions)? Yr7/8 & Yr9 Ch2	16.c Factorising Quadratics.	Multiply together two algebraic expressions with brackets such as (x+3)(x+2); Multiply together two algebraic expressions with brackets such as (x-3)(2x+2); Square a linear expression, e.g. (x + 1)^2; Factorise quadratic expressions of the form x2 + bx + c; Factorise a quadratic expression x2 – a2 using the difference of two squares;	solve, expand, factorise, simplify, expression, graph, curve, factor, coefficient, bracket, roots, Substitute See command words	**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: • Expanding and Factorising expressions • Expanding double brackets • Expanding as the difference of two squares • Factorising quadratics • Solving quadratic equations Multistep problems in a range of scenarios with reasoning, where necessary. Key & exemplar questions – WRM - SOL topics Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Algebra> skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	• Purposeful Practice Book Ch16F • Edexcel Higher Linear Course Text Book Ch8 and 30 • Common misconception information Manipulatives for algebraic representations and multiplication - Algebra Tiles (mathsbot.com) Algebra Discs (mathsbot.com) Describing area - mathspad.co.uk Difference of Two Squares - Median Don Steward Year 11 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 questions for practice and assessment. .	

A4, A11, A12, A18	What does it mean to 'solve a quadratic'? What is the best way?	16.d Quadratic graphs 16.e Solving by Factorising and Quadratic roots	Recognise a quadratic graph from its shape. Generate points and plot graphs of simple quadratic functions, then more general quadratic functions; Identify the line of symmetry of a quadratic graph; Find approximate solutions to quadratic equations using a graph; Interpret graphs of quadratic functions from real-life problems; Identify and interpret roots, intercepts and turning points of quadratic graphs. Solve quadratic equations by factorising; Find the roots of a function algebraically.		Pupils are expected to complete purposeful exercises and repeated practice on: • Substituting into equations • Plotting quadratic graphs • Solving quadratic equations graphically • Identification of turning points, lines of symmetry and roots. Multistep problems in a range of scenarios with reasoning, where necessary. Key & exemplar questions – WRM - SOL topics 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 F 9-1 Textbook: Ch16 • Purposeful Practice Book Ch16F • Edexcel Higher Linear Course Text Book Ch23 Scientific Calculators Sketching Quadratics (Resourceaholic) Year 11 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 questions for practice and assessment. .	•
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. Worded problems should be used, as well as exam style questions from the board. Further examples could include, but should not be limited to: Interpretation of real-life contexts, Matching graphs to equations, Sketching graphs from maximum / minimum/ shape/root information. Familiarisation of command words.			Knowledge Recall Lesson – Unit 16F – Shared area. Pearson's GCSE Maths F 9-1 Textbook: Problem solving, Check Up, Strengthen and Extend questions.	
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Ch16F Knowledge Quiz – Shared area.		

Mock examinations (Set 1) will take place during Term 2 – date to be confirmed.							
	Topic 4: 10F Percentages and 14F Multiplicative Reasoning (2 weeks)						
R13, R16, G14, R14	How are multipliers used in real life? Yr8 Ch10 Yr10 Ch14	10.b Equivalent proportions 14.a Percentages 14.b Growth and decay	***teachers are not expected to cover all topics listed below. On the contrary, teachers should assess existing gaps in knowledge and tailor revision to suit the needs of the class*** Recall equivalent fractions, decimals and percentages. Use different methods to find equivalent fractions, decimals and percentages. Use the equivalence of fractions, decimals and percentages to compare two proportions. Express a given number as a percentage of another number in more complex situations; Calculate percentages with a multiplier. Calculate percentage profit or loss; Make calculations involving repeated percentage change, not using the formula; Set up, solve and interpret the answers in growth and decay problems; Find the original amount given the final amount after a percentage increase or decrease; Calculate simple interest Calculate compound interest Understand the difference between simple and compound interest. Use compound interest to determine the best investments when presented with choices; **Abbey Lens:** **Business Studies – Salary, profit and loss, interest rates.**	Profit, original, increase, decrease, annual, ratio, proportion, best value, proportional change, compound measure, density, mass, volume, speed, distance, time, density, mass, volume, pressure, acceleration, velocity, Inverse, direct. 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: • Calculating percentages • FDP conversion revision • Express a given number as a percentage of another. • Repeated percentage changes. • Reverse percentages • Calculating interest • Calculate percentage profit or loss. Practical problems involving percentages. Multistep problems in a range of scenarios with reasoning, where necessary Key & exemplar questions – WRM - SOL topics	• Pearson's GCSE Maths F 9-1 Textbook: Ch14 • Purposeful Practice Book Ch14F • Common misconception information Year 10 Term 4 Knowledge Organiser for key terms, recall and low stakes quizzing. Percentage Unchanged (maths.org) Retiring to Paradise (maths.org) Roasting Old Chestnuts 4 (maths.org) Please see the Resources section for available materials on practice questions and AO1/AO2/AO3 questions for practice and 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: Percentages – including taxation, sales, inflation, interest rates, loans Compound increase and depreciation Percentage change problems including price and salary changes. Maths KS3 / GCSE: Finance - BBC Teach **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.

					Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Number > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets		
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. Worded problems should be used, as well as exam style questions from the board.			Knowledge Recall Lesson – Unit 10F – Shared area. Pearson's GCSE Maths F 9-1 Textbook: Problem solving, Check Up, Strengthen and Extend questions.	
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Ch10F Knowledge Quiz – Shared area.		
Mock examinations (Set 2) will take place during Term 3 – date to be confirmed.							
Term 3							
	Topic 5: 17F - Perimeter, Area and Volume 2, 19F Similarity (6 weeks)						
	What existing knowledge do I need to revisit to extend my Geometry skills? Yr7/8 & Yr10 Ch8	17.a Revision of existing Geometry knowledge (Unit 8F)	**Planned Consolidation** Calculating perimeter Area of 2D shapes Volume of prisms. Surface Area calculations. **Set homework on Angles in Polygons.**	**Students who require additional support at this stage may find it useful spend an extended period of time on these revision areas, when compared to others.**		• See Ch8F	
N8, N14, G9, G17, G18	What are the circle formulae and how can we apply them to other shapes? Yr8, Yr 10 Ch8	17. b Circle Vocabulary and Pi notation 17.c Circle Formulae	Recall the definition of a circle; identify, name and draw parts of a circle including tangent, chord & segment; Recall and use formulae for the circumference of a circle and the area enclosed by a circle circumference of a circle = 2πr= πd, area of a circle = πr2 ; Find circumferences and areas enclosed by circles; Use π ≈ 3.142 or use the π button on a calculator; Give answers involving the circumference/ area in terms of π; Find radius or diameter, given area or perimeter of a circles;	Area, perimeter, formula, length, width, measurement, volume, circle, circumference, radius, diameter, pi, segment, arc, sector, cylinder	**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	• Pearson's GCSE Maths F 9-1 Textbook: Ch17 • Purposeful Practice Book Ch17F • Edexcel Higher Linear Course Text Book Ch9 and 22. • Common misconception information	**Gatsby Benchmarks: Careers** Use real-life contexts wherever possible to help students to engage and relate learning to everyday and working life. E.g. Product and packaging design and cost. Maths, Why Bother? | MYPATH Careers

		17.d Composite shapes and sectors 17.e Cylinder volume and surface area	Find the perimeters and areas of semicircles and quarter-circles; Calculate perimeters and areas of composite shapes made from circles and parts of circles; Calculate arc lengths, angles and areas of sectors of circles; Find the surface area of a cylinder; Find the volume of a cylinder; Use the volume or surface area to calculate missing dimensions of a cylinder.	sphere, cone, hemisphere, segment, accuracy, surface area See command words	exercises and repeated practice on: • Using the circle area formula • Using the circle circumference formula • Calculating radii and diameters • Semi circle and quarter circle area and perimeter • Sector measurements • Perimeter and area of compound shapes • Cylinder surface area and volume problems Practical problems involving area, perimeter and money/bound calculations. Multistep problems in a range of scenarios with reasoning, where necessary Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Geometry > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	Scientific Calculators Compasses Circular guides Circle sector problems - Access Maths Paper clip - Illustrative Mathematics Mensuration – Resourceaholic Functional Volume – Access Maths Volume and Area - Mrsmorgan1 TES Year 11 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 questions for practice and assessment. .	Resources (mypathcareersuk.com)
	How can you use your algebra knowledge to apply the formulae for	17.f Pyramids, Cones, Spheres - volume and surface area	Find the surface area and volume of spheres, pyramids, cones and composite solids; Round answers to a given degree of accuracy. **The Abbey Lens:**		Pupils are expected to complete purposeful exercises and repeated practice on:	• Pearson's GCSE Maths F 9-1 Textbook: Ch17 • Purposeful Practice Book Ch17F	

	cones, pyramids, and spheres?		**Science – volume and surface area ratios.**		• Substituting into sphere formulae • Using sphere formulae • Using cone and pyramid volume calculations Practical problems involving volume and surface area and money/bound calculations. Multistep problems in a range of scenarios with reasoning, where necessary Key & exemplar questions – WRM - SOL topics Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Geometry > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	• Edexcel Higher Linear Course Text Book Ch22 • Common misconception information Scientific Calculators Year 11 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 questions for practice and assessment. .	
R6, R12, G5, G7, G19	How do congruence and similarity differ?	19.a. Similar shapes	Identify congruent shapes. Identify shapes which are similar; including all circles or all regular polygons with equal number of sides; Understand similarity of triangles and of other plane shapes, use this to make geometric inferences, and solve angle problems using similarity; Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides; Understand the effect of enlargement on perimeter of shapes; Solve problems to find missing lengths in similar shapes;	Compass, construction, shape, volume, length, area, volume, scale factor, enlargement, similar, perimeter, side, shape, bearing,	Pupils are expected to complete purposeful exercises and repeated practice on: • Scale factor calculations and drawings • Congruency proofs Practical problems involving area and perimeter.	• Pearson's GCSE Maths F 9-1 Textbook Ch19 • Purposeful Practice Book Ch19F • Edexcel Higher Linear Course Text Book Ch27 • Common misconception information Scientific Calculators	•

		19.b Congruent Triangles	Know that scale diagrams, including bearings and maps are 'similar' to the real-life examples. Use the basic congruence criteria for triangles (SSS, SAS, ASA and RHS); Solve angle problems involving congruence;	See command words	Multistep problems in a range of scenarios with reasoning, where necessary. Key & exemplar questions – WRM - SOL topics Plenary style questions - White Rose Maths - Assessment Papers	Year 11 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 questions for practice and assessment. .	
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. Worded problems should be used, as well as exam style questions from the board. Further examples could include, but should not be limited to: Large range of contextual area and volume problems. Problems involving different units. Density. Rates of fluid flow. Using arc length to find sector area. Familiarisation of command words.			Knowledge Recall Lesson – Unit 17F – Shared area. Pearson's GCSE Maths F 9-1 Textbook: Problem solving, Check Up, Strengthen and Extend questions.	
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Ch17F Knowledge Quiz – Shared area.		
Final phase of mock examinations (Set 3) will take place during Term 4/5 – date to be confirmed.							
Term 4							
	Topic 6: 20F - Further Algebra (6 weeks)						
A9, A12, A14, R10, R14	What are the different graphs I can identify and plot? Yr7/8 & Yr10 Ch9	20.a Revisiting linear graphs – plotting and interpreting. 20.b Cubic and reciprocal graphs	**Students who require additional support at this stage may find it useful to firstly revisit:** • **Substituting into expressions (Unit 2F)** • **Co-ordinates (Unit 9F)** Plotting linear graphs - Revision (See Unit 9F) Plotting graphs from data – Revision (See Unit 9F) Identify and interpret the gradient from an equation ax + by = c; Find the equation of the line through two given points; Recognise, sketch and interpret graphs of simple cubic functions; Recognise, sketch and interpret graphs of the reciprocal function;	Reciprocal, linear, gradient, functions, direct, indirect, estimate, cubic, proportion, Simultaneous, substitution, elimination, Subject, rearrange, Proof, Consecutive, Integer, odd,	**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: • Plotting non-linear graphs	• Pearson's GCSE Maths F 9-1 Textbook Ch20 • Purposeful Practice Book Ch20F • Edexcel Higher Linear Course Text Book Ch25 • Common misconception information Scientific Calculators Pre-printed axes.	**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: Business and project staff requirements through direct and inverse proportion.

		20.c Non-linear graphs	Solve direct and inverse proportion problems and recognise the graphs. Use graphical representations of indirect proportion in context; Solve problems involving inverse proportion using graphs, & read values.	even, multiple See command words	• Recognising and identifying graph types • Direct and indirect proportion in context Practical problems involving proportion. Multistep problems in a range of scenarios with reasoning, where necessary. Key & exemplar questions – WRM - SOL topics Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Algebra > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	Recognising graphs matching activity - Payphone on TES Representing Functions of Everyday Situations - Mathematics Assessment Project Year 11 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 questions for practice and assessment. .	
A19, A21, A22, A3, A5	How do I solve equations, including simultaneous equations? Yr7/8 & Yr9 Ch5	20.d Solving simultaneous equations 20e Changing the subject of a formula.	**Students who require additional support at this stage may find it useful to firstly revisit:** • **Solving linear equations (Unit 5F)** • **Writing and substituting into formula (Unit 5F)** Solve simultaneous equations (linear/linear) algebraically and graphically; Write simultaneous equations to represent a situation; Solve simultaneous equations representing a real-life situation, graphically and algebraically, and interpret the solution in the context of the problem; Change the subject of a formula involving the use of square roots and squares. **USE THE SCIENCE FORMULAE SHEET. (Equation set 1-4)**		Pupils are expected to complete purposeful exercises and repeated practice on: • Solving simultaneous equations, including manipulation. • Solving simultaneous equations graphically • Changing the subject of a formula, including powers, roots and fractions.	• Pearson's GCSE Maths F 9-1 Textbook Ch20 • Purposeful Practice Book Ch20F • Edexcel Higher Linear Course Text Book Ch23, 25, 32, 18 • Common misconception information Manipulatives for algebraic representations and equations - Equation Solver (mathsbot.com)	**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: Cost calculations from simultaneous equations.

			The Abbey Lens: **Science – Scientific formula required for GCSE.**		Practical problems involving writing simultaneous equations from a description. Multistep problems in a range of scenarios with reasoning, where necessary. Key & exemplar questions – WRM - SOL topics Plenary style questions – White Rose Maths - Assessment Papers https://www.missbsresources.com/ > Algebra > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	Simultaneous Scenarios - Teachit Maths Year 11 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 questions for practice and assessment	
N1, A3, A6	How do I prove a mathematical statement?	20.f Language and Mathematical Argument	Know the difference between an equation and an identity and use and understand the ≠ symbol; Give examples to prove / disprove mathematical statements. Answer 'show that' questions using consecutive integers (n, n + 1), squares a2, b2, even numbers 2n, and odd numbers 2n +1		Pupils are expected to complete purposeful exercises and repeated practice on: • Proving statements with examples. • Proving statements through algebraic manipulation. • Proving statements through algebraic representation and reasoning. Key & exemplar questions – WRM - SOL topics Plenary style questions – White Rose Maths - Assessment Papers	• Pearson's GCSE Maths F 9-1 Textbook Ch20 • Purposeful Practice Book Ch20F • Edexcel Higher Linear Course Text Book Ch28 • Common misconception information If a is an integer - mathspad.co.uk Prove it! - mathspad.co.uk Mathematical Proof (includes geometric proof) & answers - CIMT	

					https://www.missbsresources.com/ > Algebra > skills review Mathsbox > Topic resources > 4 Questions / Exit tickets	Year 11 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 questions for practice and assessment	
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. Worded problems should be used, as well as exam style questions from the board. Further examples could include, but should not be limited to: Estimating the size of given angles. Convert fluently between metric units of length. Use bearings in a real-life context to describe the bearing between two towns on a map. Sketch the locus of point on a vertex of a rotating shape as it moves along a line, i.e. a point on the circumference or at the centre of a wheel. Familiarisation of command words.			Knowledge Recall Lesson – Unit 15F – Shared area. Pearson's GCSE Maths F 9-1 Textbook: Problem solving, Check Up, Strengthen and Extend questions.	
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Ch15F Knowledge Quiz – Shared area.		
Mock examinations (Set 3) will take place during Term 4/5 – date to be confirmed.							
Term 5							
	Topic 8: End of Year Exams and Revision						
	What do I need to practice and revise?		Topics this term will vary and should be based on Question Level Analysis of strengths and areas for development. These will be conducted on all previous assessments and marking for individual classes. A more detailed list will be produced closer to the time based on assessment results and analysis of the year. However, there are common topics that students are likely to need to revisit based on Exam Results Analysis of the previous cohorts. Some of these topic examples are listed below and should be revisited, focussing particular on the application of skills to problem solving questions.				

Topics for students aiming for and working towards a grade 4 or 5 at the end of the year:		**Topics for students aiming for and working toward the year:**	
Calculating Angles	Year 9 – Term 5 – Ch6, Year 10 – Term 4- Ch12	Fraction arithmetic	Year 9 – Terr
Linear graphs	Year 10 – Term 2 – Ch9	Ratio and proportion problems	Year 10 – Te
Circles and sectors	Year 11 – Term 3 – Ch17	Algebraic manipulation	Year 9 – Terr Year 10 – Te
Reverse % and % change	Year 10 – Term 4 – Ch14	Decimal arithmetic	Year 9 – Terr
Surface area and volume problems	Year 10 – Term 1 – Ch8	Rounding and estimating	Year 9 – Terr

			Single / double bracket factorising	Year 11 – Term 2 – Ch16	Area and volume formula recall	Year 10 – Term 1 – Ch8	
			Teachers should refer to the locations listed for objectives and resources, in addition to the GCSE Command words, common misconceptions and general resource bank in this document. In addition to these topics, other activities to occur this term are: • Drilling and repeated practice on areas where arithmetic errors are being made. • 30 in 30 – Students are to focus on the first 30 marks on a paper in 30 minutes and review as a class to revise common mistakes and highlight errors that can be avoided. Copies of some papers can be found in the Maths Resource Area. Approximately one '30 in 30' paper can be conducted per fortnight. • Revisiting previous mock papers to add corrections and re-do questions that had not been studied fully yet at the time. • Unseen practice and specification papers – as walking talking mocks, pair work or individually based on need. • Problem solving work with a focus on literacy and multi-step questions. A mixture of past paper questions, Emporium resources, alternative exam boards and text books can be used as examples.			

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

Ch18F
The larger the denominator, the larger the fraction.
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.

Ch12F
Answers may be displayed on a calculator in surd form, causing confusion.
Students forget to square root their final answer or round their answer prematurely.
Drawing the squares on the 3 sides will help to illustrate the theorem.
Scale drawings are not acceptable.
Calculators need to be in degree mode.

To find in right-angled triangles the exact values of sin θ and cos θ for θ = 0°, 30°, 45°, 60° and 90°, use triangles with angles of 30°, 45° and 60°.
Use a suitable mnemonic to remember SOHCAHTOA.

Ch16F

x terms can sometimes be 'collected' with x^2.
Squaring negative numbers can be a problem.
Generating the table for a quadratic using a calculator often leads to mistakes. Students need to remember to use brackets, i.e. it is $(-2)^2$ not -2^2.

Ch10F

The directions on a column vector often get mixed up.
Student need to understand that the 'units of movement' are those on the axes, and care needs to be taken to check the scale.
Correct language must be used: students often use 'turn' rather than 'rotate'.
If they need to describe the transformations fully, and asked to describe a 'single' transformation they should not include two types.
Methods to include rotations with the centre of rotation inside the shape.
Forgetting to use tracing paper to find the centre of rotation.
Checking the increments on the coordinate grid when translating shapes.
Students may need reminding about how to find the equations of straight lines, including those parallel to the axes.
When reflecting shapes, the students must include mirror lines on or through original shapes. NB enlargement using negative scale factors is not included.

Ch17F

Diameter and radius are often confused and recollection of which formula to use for area and circumference of circles is often poor.
Student also struggle with knowing which to use if it is not explicitly mentioned in the question.

Ch20F

Pupils often struggle with the effects of substituting in negative values of x.
Students may incorrectly calculate with simultaneous equations where negative values are being subtracted to eliminate.
Rearranging a formula containing a squared term or root often leads to this being inversed first, when recalling BIDMAS, despite not being correct.

Ch19F

Students may incorrectly believe that all polygons are regular or that all triangles have a rotational symmetry of order 3.
Often students think that when a shape is enlarged the angles also get bigger.
Students find it difficult to understand that two vectors can be parallel and equal as they can be in different locations in the plane.

Ch15F

Some pupils may use the wrong scale of a protractor.
For example, they measure an obtuse angle as 60° rather than as 120°.
Often 5 sides only are drawn for a cuboid net.
Correct use of a protractor may be an issue.

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	Boss Maths
Resouraholic	SavemyExams
Colleenyoung.wordpress	Nrich
missquinnmaths.wordpress	Pret Homework
Just Maths	BBC Bitesize
Mathed Up	GCSE POD
Miss B resources	

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

Most of the time, homework will support in-class learning and reinforce topics that students have studied recently within the classroom to reinforce learning and secure knowledge.

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.