THE ABBEY SCHOOL
A BUSINESS & ENTERPRISE ACADEMY

Mathematics

Year 8
Scheme of Learning

Subject leader: K Ellender

Topics by term	Topic overview for Year 8					
	Term 1	**Term 2**	**Term 3**	**Term 4**	**Term 5**	**Term 6**
Topics taught	**Topic 1/Unit 1. Number Skills** 1.a Calculations 1.b Divisibility and division 1.c Calculating with negative integers 1.d Powers and roots 1.e Multiples and factors Knowledge Recall / Quiz **Topic 2/Unit 3. Statistics, Graphs and Charts** 3.a Pie charts 3.b Using tables 3.c Stem and leaf diagrams *Continued in Term 2…*	**Continued…** 3.d Comparing data 3.e Scatter graphs 3.f Misleading graphs Knowledge Recall / Quiz **Topic 3/Unit 2. Area and Volume** 2.a Area of a triangle 2.b Area of a parallelogram and trapezium 2.c Area of a circle 2.d Volume of cubes and cuboids 2.e 2D rep. of 3D solids 2.f Surface area - cuboids 2.g Measures Knowledge Recall / Quiz	**Topic 4/Unit 4. Expressions and equations** 4.a Algebraic powers 4.b Expressions and brackets 4.c Factorising expressions 4.d One-step equations 4.e Two-step equations 4f. Inequalities Knowledge Recall / Quiz **Topic 5/Unit 5/9. Real life graphs and straight-line graphs** 5.a Conversion graphs 5.b Distance-time graphs 5.c Line graphs 5.d Harder real-life graphs *Continued in Term 4…*	**Continued…** 9.a Sequences 9b. Straight line graphs 9.c Direct proportion on graphs Knowledge Recall / Quiz **Topic 6/Unit 6. Decimals** 6.a Ordering decimals and rounding 6.b Place Value Calculations 6.c Calculations with decimals 6.d Ratio and proportion with decimals Knowledge Recall / Quiz *If Term 4 is less that 6 weeks, this unit will roll into term 5.	**Topic 7/Unit 7 Lines and angles** 7.a Quadrilaterals 7.b Angles in parallel lines 7.c Exterior and interior angles 7.d Solving geometric problems 7e. Constructions Knowledge Recall / Quiz **Topic 8/Unit 8 Calculating with fractions** 8.a Ordering fractions 8.b Adding, subtracting 8.c Multiplying, dividing 8.d Mixed numbers Knowledge Recall / Quiz *If Term 5 is less that 6 weeks, this unit will roll into term 6.	**Topic 9/Unit 10 Percentages, decimals and fractions** 10.a Fractions & decimals 10.b Equivalent proportions 10.c Percentages of amounts Knowledge Recall / Quiz **Topic 3/Unit 2. Area and Volume Recap/Revision** Recap key topics involving area and volume covered in term 2.

	Vital prerequisites	**Vital prerequisites**	**Vital prerequisites**	**Vital prerequisites**	**Vital prerequisites**	**Vital prerequisites**
	Basic addition, subtraction, multiplication and division skills from Year 7 Term 1. Knowledge of how to calculate with negative numbers from Year 7 Term 1. Knowledge of squares, cubes, roots and primes from Year 7 Term 1. Ability to list factors and multiples of a number. Year 7 Displaying and Analysing data. Knowledge of how to display data and how to calculate an average	Line graphs from Year 7, Term 2. Year 7, Term 3 area and perimeter of basic shapes such as rectangles and squares Confidence in converting between different metric units. Term 3, Year 7.	Knowledge of basic function machines from Year 7, Term 2. Students should already be comfortable in basic simplification, substitution, writing expressions and creating formulae. Knowledge of linear graphs from Year 7, Term 6. This covers aspects such as sequences, coordinates and straight-line graphs.	Sequences and straight-line graphs from Year 7, Term 6. Year 7, Term 3 knowledge of decimals. Students should be comfortable in dealing with scales, rounding, arithmetic and basic arithmetic with decimals (addition, subtraction, multiplication and dividing a decimal by an integer) Proportion work from Year 7, Term 5. Writing ratio, fractions and percentages are all needed.	Lines and angles (Year 7, Term 5) introduces the idea of basic angle facts including: • Angles in a triangle • Angles on a straight line • Angles around a point • Angles in a quadrilateral • Angles in polygons (HA) Knowledge of basic shapes such as parallelograms, trapeziums, kits and rhomboids. Year 7 Terms 3 and 4. Students should be comfortable dealing with basic fraction problems including simplifying, arithmetic and calculating basic fractions of amounts.	Year 7, Terms 3 and 4 work with fractions and percentages. Students should be able to calculate basic fractions of amounts and be aware of the equivalence between some fractions and percentages.
	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?**
	Number problems are fundamental to most aspects of the mathematics curriculum. More specifically, students need to be comfortable with squares, cubes, etc… so that they can calculate the HCF and LCM of two or more numbers (Year 9, Term 1). Standard form also requires a sound knowledge of indices. Statistics is ideal for teaching stand-alone topics, so the data unit is placed here for that reason. Students are expected to know all of the graphs and charts in this chapter for their GCSE.	Geometry is historically a weak area in the maths syllabus. This unit is placed early in the year so that it can be recapped in Term 6. Students need to be able to solve basic geometric problems in preparation for harder topics such as volume and surface area of more complex 3D solids, Pythagoras and trigonometry, compound shapes, bearings, loci and constructions.	Algebra makes up a significant part of the GCSE. Students are introduced into basic expanding and factorising here in preparation for quadratics and cubics in Year 9, Term 5. Links to solving harder equations such as quadratics, algebraic fractions and simultaneous equations (Year 10). Time series graphs are looked at in Year 9 and scatter graphs are looked at in more detail to make predictions. Non-linear graphs covered in Year 11.	Geometric sequences seen in year 9 so a fundamental understanding of linear sequences and graphs is essential. Solving proportion equations is covered in Year 10. Decimals are used within many other topics at GCSE such as standard form, Pythagoras, trigonometry, estimation, ratio and compound measures.	Angles in polygons are looked at in Term 6, Year 9. This then leads onto the Pythagoras and trigonometry which students see for the first time. Circle Theorems are seen in Year 11 if the higher tier is taken. Constructions taught towards the end of Year 8 as it is not seen again until the end of Year 10 (Term 6). This reduces the amount of time that students do not see the topic for. Fractions appear across many topics in GCSE and are extended to algebraic fractions in Year 11. Fractions also appear within ratio in Year 10.	Fractions, decimals and percentages are used interchangeably at GCSE level. Links to probability in Year 10 and students need to be aware of the equivalence between some FDPs. Area and volume links to percentages. Area and volume is recapped at the end of the year as it is historically an area that students struggle with.

					Mixed number calculations are a common theme across GCSE papers so teachers should tackle this early in Year 8 if possible. Mixed numbers are seen again in Year 9.	

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. For KS2 identification, please refer to the KS3 SOW and National Curriculum linked document in the shared area.

Pearson's Edexcel KS3							
Specification References	**Big questions**	**Topic area:**	**Learning objectives / Outcomes** **All: Sets 1-4 focus** **Most: Sets 1-3 focus** **Some: Sets 1-2 focus** **Examples**	**Key Terms/ concepts Literacy Numeracy**	**Assessment and homework tasks**	**Resources**	**Personal Development Curriculum links (SMSC, British Values, PSHE)**
Term 1							
	Topic 1: Unit 1 - Number (Approximately 4 weeks)						
N2 N3 N4 N6	How do you calculate accurately with positive and negative numbers? KS2, Yr7 Ch2	1.a Calculations	Use written methods to add and subtract more than two numbers (including decimals). Multiply with accuracy. Use mental calculation for multiplication. Estimate answers to calculations. Understand, choose and use a range of strategies for mental calculations by developing an understanding of relationships between numbers.	Add, subtract, multiply, divide, sum, product, total, negative, integer, calculation, square, indices, powers, roots, prime, factor, multiple, LCM, HCF, See command words	**Starter quizzes for the term should include:** **Focused accuracy drills including timetables** **Required prior knowledge** **Mixed skills practice** **Knowledge gap support** **Look, cover, write, check.** Pupils are expected to complete purposeful exercises and repeated practice on: • 4 operations - integers, • 4 operations - decimals • 4 operations - negatives. • Recall of square and cube numbers • The order of operations • Prime factor decomposition • HCF and LCM Aim for proficiency and ensure written work is of a high quality. Practical problems involving operations in	• Pearson's Pi2 Ex1 • Pearson's Theta2 Ex1 • Person's Delta2 Ex1 • Support/Core/Extend KS3 book Year 8 Ch1 • Cambridge Essentials 7 support/core NCh3&4 • KS3 Consistency document Key & exemplar questions – WRM - Add and Subtract WRM - Multiply and divide WRM - Multiples & factors WRM - Directed numbers Number skills - textbook generator Question Generators - MathsBot.com Printed directed number lines. Manipulatives for directed number support: Number Line (mathsbot.com) Directed numbers drills - Directed Number Patterns (mathsbot.com) Manipulatives for prime number representations and multiplication Prime Factor Tiles (mathsbot.com)	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 & Personal Finance** Use real-life contexts with basic integer and decimal calculations wherever possible in KS3 to help students to engage and relate learning to everyday and working life. Maths, Why Bother? | MYPATH Careers Resources (mypathcareersuk.com) Discuss the relevance of Maths skills to develop confidence in monetary calculations and why this is important. This does not need to be a separate defined topic, but should be incorporated within
		1.b Divisibility and division	Know and use divisibility rules. Use a written method to divide decimal numbers by integers. Understand the relationships between divisibility rules and relate to factors and multiples.				
		1.c Calculating with negative integers	Add, subtract, multiply and divide positive and negative numbers, including larger numbers and decimals. Extend the 'rules' for calculations with negative numbers to very large numbers and decimal numbers. Distinguish between the negative sign and subtract operation.				
	What other types of numbers can I calculate with? KS2, Yr7 Ch2	1.d Powers and roots	Calculate using squares, square roots, cubes and cube roots. Give integers that a square root lies between. Relate knowledge of negatives to negative square roots and give two answers for square roots. Calculate combinations of squares, square roots, cubes, cube roots and brackets with the order of operations. Use a calculator to check answers. Understand how to write complex calculations with full correct notation.				
		1.e Multiples and factors	Use index notation. Write a number as a product of its prime factors.				

			Understand that prime numbers are the building blocks for the natural numbers. Use prime factor decomposition to find the HCF and LCM. Understand when to use HCF and LCM to find the answer to a word problem.		real life contexts and multistep problems in a range of scenarios such as money and cost with reasoning, where necessary. Plenary style questions - White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	Active Learn > KS3 Maths Progress > Resources > Ch1 PDFs Year 8 Term 1 Knowledge Organiser for key terms, recall and low stakes quizzing. See Resources section for available materials on skills practice and worded style questions for progression and assessment.	lessons as examples and practice.
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. Worded problems should be used, as well as addressing any consistent errors, encourage and explore topic links and supported multistep problems		Knowledge Recall Lesson – Unit 1 – Shared area. Pearson's KS3 Math Textbook: Problem solving, Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Unit 1 Knowledge Quiz – Shared area.		
	Topic 2: Unit 3 - Statistics, Graphs and Charts (Approximately 2 weeks + 2 weeks)						
S2 S4 S5 S6	How do we display and interpret data with graphs and charts? KS2, Yr7 Ch1	3.a Pie charts 3.b Using tables	Interpret simple pie charts. Calculate angles and draw pie charts. Understand that pie charts show the proportions of data, and when a pie chart is a suitable diagram to represent data. Use two-way tables. Draw a two way table where appropriate to solve problems.. Revise averages and range. Understand that a table presents data from lists or that could be represented in other types of diagram Calculate the mean from a frequency table. Use tables for grouped data, find modal class and estimate range. Move between tables and other representations. Understand that the method for calculating mean from a frequency table is the same as the method for calculating the mean from a list, but more efficient. Understand which average is appropriate/inappropriate/more appropriate to represent a set of data.	Pie chart, bar chart, frequency table, pictogram See command words	Pupils are expected to complete purposeful exercises and repeated practice on: • Drawing different graphs and charts. • Finding the mean, median, mode and range Practical problems involving graphs and charts from real life data. Multistep problems in a range of scenarios with reasoning, where necessary including reading and using values from graphs, and transferring	• Pearson's Pi2 Ex3 • Pearson's Theta2 Ex3 • Person's Delta2 Ex4 • Support/Core/Extend KS3 book Year 8 Ch2 • Cambridge Essentials support/core SCh1-2 Key & exemplar questions – WRM - Representing data Pre-printed axis and graphs where appropriate. Compasses, protractors Graph Paper Active Learn > KS3 Maths Progress > Resources > Ch3 PDFs	**The Abbey Lens:** There are opportunities here to use graphical data from KS3 Geography, History and Science for cross-curricular applications and reinforcement of importance of numerical proficiency. **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.

		3.c Stem and leaf diagrams	Draw and interpret stem and leaf diagrams Back-to-Back diagrams. Find mode, median and range from stem and leaf diagrams.		information from one graph onto another. Ensure written work is of a high quality and encourage students to SHAPE answers when explaining. Plenary style questions - White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets **Gatsby Benchmarks: Careers & Personal Finance** Use real-life contexts with graphs and their applications wherever possible in KS3 to help students to engage and relate learning to everyday and working life.	Year 8 Term 2 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on skills practice and worded style questions for progression and assessment.	Activity 1.1 - Democracy and Law – General Elections British values maths resources **Gatsby Benchmarks: Careers & Personal Finance** Use real-life contexts with graphs and their applications wherever possible in KS3 to help students to engage and relate learning to everyday and working life. Discussions relating to the development of analytical industries and data related careers should be encouraged.
Term 2							
	Topic 2: Unit 3 - Statistics, Graphs and Charts (Continued for 2 weeks)						
	How do we display and interpret data with graphs and charts? KS2, Yr7 Ch1	3.d Comparing data 3.e Scatter graphs	Draw comparisons on two sets of data using statistics or the shape of the graph. Compare two sets of data using averages and range. Draw line graphs to compare two sets of data. Compare two sets of data using the shape of a line graph or pie charts. Understand how to make comparisons between data. Draw scatter graphs. Describe types of correlation. Draw and use a line of best fit on a scatter graph. Deepen understanding of correlation by considering examples where there is weak or no correlation, as well as examples where there is correlation that you might not expect (between two seemingly random quantities). Interpret graphs and charts.	Scatter graph, correlation,, mean, median, mode, range, estimate, average, compare, LOBF, See command words	Pupils are expected to complete purposeful exercises and repeated practice on: • Drawing different graphs and charts. • Finding the mean, median, mode and range Practical problems involving graphs and charts from real life data. Multistep problems in a range of scenarios with	• Pearson's Pi2 Ex3 • Pearson's Theta2 Ex3 • Person's Delta2 Ex4 • Support/Core/Extend KS3 book Year 8 Ch2 • Cambridge Essentials support/core SCh1-2 Key & exemplar questions – WRM - Representing data Pre-printed axis and graphs where appropriate. Compasses, protractors Graph Paper	

		3.f Misleading graphs	Explain why a graph or chart could be misleading such as pictograms. Understand when a statistical diagram is appropriate/inappropriate to represent a set of data. Eg when to use a bar chart/stem and leaf and when to use a pie chart.		reasoning, where necessary including reading and using values from graphs, and transferring information from one graph onto another. Ensure written work is of a high quality and encourage students to SHAPE answers when explaining. Plenary style questions - White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	Active Learn > KS3 Maths Progress > Resources > Ch3 PDFs Year 8 Term 2 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on skills practice and worded style questions for progression 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 addressing any consistent errors, encourage and explore topic links and supported multistep problems		Knowledge Recall Lesson – Unit 3 – Shared area. Pearson's KS3 Maths Textbook: Problem solving, Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Unit 3 Knowledge Quiz – Shared area.		
	Topic 3: Unit 2 - Area and Volume (4 weeks)						
G12 G13 G14 G16	How do the measure the size of a 2D shape or 3D solid? KS2, Yr7 Ch4	2.a Area of a triangle	Revisit the difference between area and perimeter – year 7. Derive and use the formula for the area of a triangle. Calculate the area of compound shapes made from rectangles and triangles. Use of Pythagoras' Theorem to calculate missing triangle dimensions for use in area calculations. When calculating area of triangle it doesn't matter which measurements you choose for the base and height, as long as they are perpendicular to each other.	Area, volume, units, parallelogram, trapezium, cuboid, prism, perpendicular, base, height, triangle, isosceles, composite,	Pupils are expected to complete purposeful exercises and repeated practice on: • Finding the area of different shapes. • Finding the area of compound shapes.	• Pearson's Pi2 Ex2 • Pearson's Theta2 Ex2 • Person's Delta2 Ex3 • Support/Core/Extend KS3 book Year 8 Ch2 • Cambridge Essentials support/core GMCh2 Key & exemplar questions – WRM Trapezia and Circles	

		2.b Area of a parallelogram and trapezium 2.c Area of a circle 2.d Volume of cubes and cuboids 2.e 2D representations of 3D solids 2.f Surface area of cubes and cuboids 2.g Measures	Derive and use the formula for the area of a parallelogram. Use the formula for the area of a trapezium. Generalise understanding that all areas are product of perpendicular lengths. Understand that composite areas can be calculated by 'subtracting' a shape, as well as by splitting into two. Understand the terms radius, diameter, and circumference. Use the formulae to calculate the area and circumference of a circle. Calculate the volume of cubes and cuboids. Calculate the volume of 3D solids made from cuboids. Calculate the volume of triangular prisms. Solve volume problems. Sketch nets of 3D solids. Draw plans and elevations of 3D solids. Draw 3D solids on isometric paper. Recognise faces, edges and vertices of 3D solids. Calculate the surface area of cubes and cuboids. Solve surface area problems. Convert between metric measurements (km, metres, cm, and mm, litres and ml, kg and g) Solve problems in everyday contexts involving measures. Convert between cm^3 and litres. Know rough metric equivalents of imperial measures. Use tonnes and hectares. Convert between units of area (cm^2 /mm^2 etc.) **The Abbey Lens: Technology – Design and measurements.**	surface, net, plan, elevation, isometric, cube, face, edge, vertex, metric, imperial, hectare	• Finding the volume and surface area of 3D shapes • Finding the volume and surface area of 3D shapes • Drawing and recognising 2D representations of 3D solids. • Metric unit conversions. Practical problems involving area and volume with a real-life context including money. Multistep problems in a range of scenarios with reasoning, where necessary, including equal areas, working backwards and compound areas. Ensure written work is of a high quality. Plenary style questions - White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	3D solids and cardboard nets for visualisation. Multilink cubes Geometry skills - textbook generator Question Generators - MathsBot.com Active Learn > KS3 Maths Progress > Resources > Ch2 PDFs Year 8 Term 1 Knowledge Organiser for key terms, recall and low stakes quiz. See Resources section for available materials on skills practice and worded style questions for progression 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 addressing any consistent errors, encourage and explore topic links and supported multistep problems		Knowledge Recall Lesson – Unit 2 – Shared area. Pearson's KS3 Maths Textbook: Problem solving, Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Unit 2 Knowledge Quiz – Shared area.		
Term 3							

	Topic 4: Unit 4 - Expressions and equations (Approximately 3 weeks)						
A1, A2, A3, A4, A5, A6, A7	How do I simplify algebra? KS2, Yr7 Ch3	4.a Algebraic powers	Revision of collecting like terms and multiplying terms. Understand that an algebraic expression is the generalisation of a rule or relationship. Understand and simplify algebraic powers with the laws of indices including with multiplication, division and brackets. Write and use expressions involving powers. Understand that powers of variables are written in the same way as powers of numbers, and that ab^2 means a x b^2 and not $(ab)^2$ Understand the meaning of 'variable' and that the choice of letter is not important when writing an expression.	Algebra, variable, collecting like terms, bracket, expand, factorise, solve substitute See KS3 command words	**Starter quizzes for the term should include:** **Focused accuracy drills including timetables** **Required prior knowledge** **Mixed skills practice** **Knowledge gap support** **Look, cover, write, check.** Pupils are expected to complete purposeful exercises and repeated practice on: • Simplifying and writing expressions, including those with powers. • Expanding (and simplifying brackets). • Factorising expressions. • Solving equations Practical problems involving using algebraic expressions and equations to represent a situation and use it as a process to solve for unknown quantities. Multistep problems in a range of scenarios such as expanding within equations. Plenary style questions - White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	• Pearson's Pi2 Ex4 • Pearson's Theta2 Ex4 • Person's Delta2 Ex2 • Support/Core/Extend KS3 book Year 8 Ch4 • Cambridge Essentials support/core ACh2 • KS3 Consistency document Key & exemplar questions – WRM - Indices WRM - Brackets and Equations Manipulatives for algebraic representations and multiplication - Algebra Tiles (mathsbot.com) Algebra Discs (mathsbot.com) Manipulatives for visual balancing representations Equation Solver (mathsbot.com) Active Learn > KS3 Maths Progress > Resources > Ch4 PDFs Year 8 Term 3 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on skills practice and worded style questions for progression and assessment..	
		4.b Expressions and brackets	Expand brackets. Expand and simplify algebraic expressions and formulae using brackets and division. Understand when to use brackets when writing an expression, and when the brackets are not needed.				
		4.c Factorising expressions	Factorise expressions. Understand the significance of multiplying by both terms in a bracket - the expression in the bracket is one factor, the term in front of the bracket is another factor - and that factorisation is the inverse of this.				
	How do you solve an equation?	4.d One-step equations	Find the inverse of a simple function. Write and solve one-step equations using function machines. Know the difference between expressions, formulae and equations. Understand that while you can solve most one step equations 'in your head', you are doing this by identifying and using inverse operations (informally).				
		4.e Two-step equations	Solve two-step equations using function machines. Solve problems using equations. Understand that writing and solving an equation is a powerful and efficient method for solving many problems involving an unknown quantity - 'using x for the unknown' is a useful problem solving strategy. Know that solutions to equations can be positive and negative integers, and (simple) decimals and fractions. Know and use priority of operations to decide on order of inverse operations when using the balancing method. Begin to understand and verbalise inequality notation Be able to identify integer values from an inequality				

		4f. Inequalities introduction	Be able to draw an inequality on a number line Be able to write an inequality from a number line. Be able to solve simple linear inequalities as an extension to solving equations.				
		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. Worded problems should be used, as well as addressing any consistent errors, encourage and explore topic links and supported multistep problems		Knowledge Recall Lesson – Unit 4 – Shared area. Pearson's KS3 Maths Textbook: Problem solving, Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Unit 4 Knowledge Quiz – Shared area.		
	Topic 5: Unit 5/9: Real-life graphs and Straight-line graphs (Approximately 3 weeks + 2 weeks)						
A9, A10, A14	How can we represent real life in a graph?	5.a Conversion graphs	Use and interpret conversion graphs. Plot conversion graphs from a table of data. Understand why a conversion graph between currencies or units of length, mass and volume will always be a straight line through the origin. **The Abbey Lens: Geography – Countries and cities.**	Conversion graph, Distance-time graph, speed, line graph, trend. See KS3 command words	Pupils are expected to complete purposeful exercises and repeated practice on: • Drawing different real life graphs such as conversion and line graphs • Plotting and interpreting speed, distance, time graphs. • Identifying information from real life graphs Practical problems involving real life graphs. Ensure written work is of a high quality and encourage students to SHAPE answers when explaining. Plenary style questions - White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	• Pearson's Theta2 Ex5/9 • Person's Delta2 Ex4/10 • Support/Core/Extend KS3 book Year 8 Ch5/9 Key & exemplar questions – WRM - Line graphs Active Learn > KS3 Maths Progress > Resources > Ch5/9 PDFs Year 8 Term 3 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on skills practice and worded style questions for progression and assessment .	**Gatsby Benchmarks: Personal Finance** 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
		5.b Distance-time graphs	Interpret distance-time graphs. Plot simple distance-time graphs from descriptive text. Plot distance-time graphs from descriptive text. Draw and use graphs to solve distance-time problems. Understand that a distance time graph can represent journeys using different units of distance and time. Understand that on a distance time graph showing a journey of 60 miles in 1 hour by a straight line, the car's speed may have varied slightly from minute to minute, but the graph does not show this. **The Abbey Lens: Science – Distance-time graphs**				
		5.c Line graphs	Plot line graphs from tables of data. Interpret line graphs and identify trends. On a line graph, intermediate points are only estimates and not actual values. Begin to understand that is more reliable to predict intermediate values within the data (interpolate) than to assume a trend will continue and predict future values (extrapolate). Understand that a graph may show seasonal or other variations, but still show an upward or downward trend. Draw and interpret curved graphs from a range of sources.				

		5.d Curved graphs	Understand that for some graphs it is more realistic to join data points with a curve than with straight lines, as a curve better represents the data. Unit continued into Term 4.				
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 5: Unit 5/9 - Real-life graphs and Straight-line graphs (Continued for 2 weeks)						
A9, A10, A14	What are the different ways of plotting a graph?	9.a Sequences 9b. Straight line graphs 9c. Direct proportion on graphs * If time	Recognise, describe and continue number and pattern sequences. Revision from year 7. Find patterns and rules in sequences. Use the term-to-term rule to work out terms in a sequence. Use the position to term rule to work out the terms of a sequence. Use the position to term rule to work out if a number is in the sequence. Begin to relate the nth term for sequence generation for a linear equation in the form of y = mx+c through the relationship between co-ordinates. . Plot co-ordinates in the four quadrants. Plot a straight-line graph for a basic equation. E.g. y = x+2, y = x - 4, y = 3x Plot a straight-line graph for a more equations involving more than one operation. Eg.y =3 x+2 Plot a straight-line graph with a negative gradient. Investigate the relationship between parallel graphs and graphs with the same intercept to relate the values of m and c to the equation. Calculate the gradient of a linear graph and understand this value changes the steepness of the graph.. Write the equations of straight line graphs in the form y = mx + c. Recognise when values are in direct proportion with or without a graph. Introduce the idea of a multiplicative relationship in the form of y = kx on a linear graph. Plot graphs and read values to solve problems.	Term, position, sequence, co-ordinate, equation, axes, quadrant , direct proportion, linear, table of values, y=mx+c, gradient, midpoint, y-intercept. See command words	**Starter quizzes for the term should include:** **Focused accuracy drills including timetables** **Required prior knowledge** **Mixed skills practice** **Knowledge gap support** **Look, cover, write, check.** Pupils are expected to complete purposeful exercises and repeated practice on: • Continuing and generating sequences • Plotting simple straight line graphs • Finding the equation of a line using the gradient and y-intercept Multistep problems in a range of scenarios with reasoning, where necessary. Plenary style questions - White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	• Pearson's Pi2 Ex8 • Pearson's Theta2 Ex5/9 • Person's Delta2 Ex4/10 • Support/Core/Extend KS3 book Year 8 Ch5/9 • KS3 Consistency document Key & exemplar questions – WRM Sequences WRM - Line graphs Year 8 Term 4 Knowledge Organiser for key terms, recall and low stakes quizzing. Pre-printed axes.. Please see the Resources section for available materials on skills practice and worded style questions for progression 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 addressing any consistent errors, encourage and explore topic links and supported multistep problems		Knowledge Recall Lesson – Unit 5/9 – Shared area. Pearson's KS3 Maths Textbook: Problem solving, Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Unit 5/9 Knowledge Quiz – Shared area.		
	Topic 6: Unit 6 - Decimals and ratio (Approximately 4 weeks)						
N1, N2, N15, R3, R4, R5	What is place value and why is it important? KS2, Yr7 Ch7	6.a Ordering decimals and rounding 6.b Place-value calculations	Round decimals to two or three decimal places. Order decimals of any size, including positive/negative. Round numbers to a given number of significant figures. Round numbers to an appropriate degree of accuracy. Understand when it is more appropriate (and more accurate) to round to DP than SF (or vice versa). Convert larger numbers and decimals into standard form. Multiply larger numbers. Multiply decimals with up to two decimal places. Multiply any number by 0.1 and 0.01. Divide by 0.1 and 0.01. Multiply and divide by decimals. Solve problems involving decimals and all four operations. Understand the relative sizes of answers to related decimal calculations. Apply the inverse relationship of multiplication and division to decimal calculations and related calculations.	Round, decimal, accuracy, place value, significant figure, ratio, proportion, inverse, See command words	Pupils are expected to complete purposeful exercises and repeated practice on: • Rounding to decimal places or significant figures • Multiplying and dividing decimals • Simplifying and dividing into a ratio. • Mixed ratio problems including proportion and unit ratio uses. Practical problems involving decimals and ratio in real-life contexts. Multistep problems in a range of scenarios with reasoning, where necessary. Aim for proficiency and ensure written work is of a high quality. Plenary style questions - White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	• Pearson's Pi2 Ex5 • Pearson's Theta2 Ex6 • Person's Delta2 Ex6 • Support/Core/Extend KS3 book Year 8 Ch6 • Cambridge Essentials support/core NCh3-5 • KS3 Consistency document Key & exemplar questions – WRM - Place Value WRM - Ratio and Scale WRM - Standard form Ratio 'bar method' manipulatives - Bar Modelling (mathsbot.com) Ratio shares manipulatives - Sharing in a ratio (mathsbot.com) Active Learn > KS3 Maths Progress > Resources > Ch6 PDFs Year 8 Term 4 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on skills practice and worded style questions for progression and assessment	**Gatsby Benchmarks: Careers & Personal Finance** Use real-life contexts with decimal monetary values wherever possible in KS3 to help students to engage and relate learning to everyday and working life. Discuss the relevance of Maths skills to develop confidence in monetary calculations and why this is important, incorporated within lessons as examples and practice.
	How do we calculate with decimals and ratio ? KS2, Yr7 Ch7	6.c Ratio and proportion with decimals	Use ratio notation, simplify a ratio and recognise equivalents – year 7 revision. Understand the same 'rule' applies to simplifying ratios involving fractions as ratios involving decimals'. Solve worded problems involving ratio. Divide a quantity into two or more parts in a given ratio. Solve ratio and proportion problems involving decimals. Use unit ratios. Understand how to use unit ratios to make comparison.				**Gatsby Benchmarks: Careers & Personal Finance** Use real-life contexts with ratios wherever possible in KS3 to help students to engage and relate learning to everyday and working life.

		Knowledge Recall	Big Questions of the unit are reviewed, and key areas revisited. Planned consolidation. Worded problems should be used, as well as addressing any consistent errors, encourage and explore topic links and supported multistep problems		Knowledge Recall Lesson – Unit 6 – Shared area. Pearson's KS3 Maths Textbook: Problem solving, Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Unit 6 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 7: Unit 7 Lines and angles (Approximately 3 weeks)						
G3, G4, G6, G7	How can we calculate angles without measuring? KS2, Yr7 Ch8	7.a Quadrilaterals 7.b Angles in parallel lines 7.c Exterior and interior angles 7.d Solving geometric problems	Revision of calculating angles in triangles, straight lines and points – year 7 Revision of conventional terms and notations to describe. Classify quadrilaterals by their geometric properties. Solve geometric problems using side and angle properties of special quadrilaterals, including co-interior angles. Calculate angles within quadrilaterals Name quadrilaterals from their properties. Identify alternate angles on a diagram. Identify corresponding angles. Identify vertically opposite angles Solve problems using properties of angles in parallel and intersecting lines. Understand that there are often different ways to find an answer. Calculate the sum of the interior and exterior angles of a polygon. Work out the sizes of interior and exterior angles of a polygon. Understand where the formula (n – 2) x 180 comes from. Solve geometrical problems showing reasoning. Solve problems involving angles by setting up equations. Solving geometric problems may involve using angles in parallel lines, properties of triangles, quadrilaterals and polygons.	Parallel, acute, obtuse, reflex, corresponding, alternate, co-interior, vertically opposite, interior, exterior See KS3 command words	**Starter quizzes for the term should include:** **Focused accuracy drills including timetables** **Required prior knowledge** **Mixed skills practice** **Knowledge gap support** **Look, cover, write, check.** Pupils are expected to complete purposeful exercises and repeated practice on: • Finding missing angles in straight lines, around a point, in a triangle, quadrilateral and other polygons. • Identification and calculation of angles in parallel lines. • Combining multiple angle facts to solve problems.	• Pearson's Pi2 Ex6 • Pearson's Theta2 Ex8 • Support/Core/Extend KS3 book Year 8 Ch7 • Cambridge Essentials 8 support/core GMCh2 Key & exemplar questions – WRM - Construct and Measure WRM - Geometric reasons WRM - Parallel lines & Polygons Active Learn > KS3 Maths Progress > Resources > Ch7 PDFs Year 8 Term 6 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on skills practice and worded style questions for progression and assessment .	

		7e. Constructions	Begin to explore basic ruler and compass constructions such as angle bisector and perpendicular to a line segment.		Practical problems involving angles. Multistep problems in a range of scenarios with reasoning, where necessary. Plenary style questions - White Rose Maths - Assessment Papers Maths Box > 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 addressing any consistent errors, encourage and explore topic links and supported multistep problems		Knowledge Recall Lesson – Unit 7 – Shared area. Pearson's KS3 Maths Textbook: Problem solving, Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Unit 7 Knowledge Quiz – Shared area.		
	Topic 8: Unit 8 Calculating with fractions (Approximately 3 weeks)						
N8, N10, N12	How do you calculate with fractions? KS2, Yr7 Ch5	8.a Ordering fractions 8.b Adding and subtracting fractions 8.c Multiplying and Dividing fractions 8.d Calculating	Identify fractions more than ½ or less than ½. Order fractions and compare fractions. Calculate the fraction of an amount. Add and subtract fractions with any size denominator. Calculate with negative fractions and with negative answers. Multiply integers and fractions by a fraction. Use appropriate methods for multiplying fractions. Apply BIDMAS to fraction calculations, involving the multiplication of fractions. Divide integers and fractions by a fraction. Use strategies for dividing fractions. Find the reciprocal of a number. Apply BIDMAS to fraction calculations, involving the division of fractions. Write a mixed number as an improper fraction. Use the four operations with mixed numbers.	Numerator, denominator, common denominator, mixed number, improper fraction, inverse, reciprocal See command words	Pupils are expected to complete purposeful exercises and repeated practice on: • Adding, subtracting, multiplying and dividing fractions. • The four operations with mixed numbers Practical problems involving fractions in real-life contexts. Aim for proficiency and ensure written work is of a high quality. Multistep problems in a range of scenarios with	• Pearson's Pi2 Ex9 • Pearson's Theta2 Ex8 • Person's Delta2 Ex6 • Support/Core/Extend KS3 book Year 8 Ch8 • Cambridge Essentials support/core NCh2 • KS3 Consistency document Key & exemplar questions – WRM - Fractions add and subtract WRM - Fractions multiplying & dividing Active Learn > KS3 Maths Progress > Resources > Ch8 PDFs Year 8 Term 5 Knowledge Organiser for key terms,	**SMSC & BV** Activity 2.E/2.1 – Respect and Liberty. If Britain were 100 people. (Involves FDP calculations) .British values maths resources **Gatsby Benchmarks: Careers** Use real-life contexts with fractional calculations wherever possible in KS3 to help students to engage and relate learning to everyday and working life. Maths, Why Bother? | MYPATH Careers Resources (mypathcareersuk.com)

		with mixed numbers	Understand the four operations with mixed numbers, where one or more mixed number is negative, or the answer is a negative mixed number. Apply BIDMAS to mixed number calculations.		reasoning, where necessary. Plenary style questions - White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	recall and low stakes quizzing. Please see the Resources section for available materials on skills practice and worded style questions for progression 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 addressing any consistent errors, encourage and explore topic links and supported multistep problems		Knowledge Recall Lesson – Unit 8 – Shared area. Pearson's KS3 Maths Textbook: Problem solving, Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Unit 8 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 9: Unit 10 Percentages, decimals and fractions (Approximately 3 weeks)						
N8, N10, N12	How and why do I convert between fraction, decimal and percentages? KS2, Yr7 Ch4,5	10.a Fractions and decimals 10.b Equivalent proportions	Recall equivalent fractions and decimals. Order fractions by converting them to decimals or equivalent fractions. Change time to decimal hours. Recognise recurring and terminating decimals and convert between them. Recognise where fractions of time and other measures result in a recurring decimal. 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. Understand proportions involving large numbers. Know how to deal with proportions that involve decimals. Compare and interpret more than two proportions.	Fraction, decimal, percentage, equivalent, proportion, increase, decrease, multiplier, reverse percentage. See KS3 command words	Pupils are expected to complete purposeful exercises and repeated practice on: • Converting between fractions, decimals and percentages. • Finding percentages of amounts, percentage increases and percentage decreases. Practical problems involving fractions, decimals and percentages. Multistep problems in a range of scenarios with	• Pearson's Pi2 Ex9 • Pearson's Theta2 Ex10 • Person's Delta2 Ex6 • KS3 book Year 8 Ch10 • Cambridge Essentials 8 support/core NCh2 • KS3 Consistency document Key & exemplar questions – WRM - FDP equivalents WRM - Fractions and percentages WRM - Percentage problems Active Learn > KS3 Maths Progress > Resources > Ch10 PDFs Year 8 Term 6 Knowledge Organiser for key terms,	**Gatsby Benchmarks: Careers & Personal Finance** Use real-life contexts with percentage values wherever possible in KS3 to help students to engage and relate learning to everyday and working life. Discuss the relevance of Maths skills to develop confidence in percentage calculations and why this is important, incorporated within lessons as examples and practice
	What is a multiplier and how do they work?	10.c Percentages of amounts	Express one number as a percentage of another when the units are different. Calculate percentages of amounts with a multiplier. Work out a number increased or decreased by a percentage.				

			Calculate percentage change including profit and loss. Use the unitary method to solve percentage problems. Use a multiplier to calculate amounts increased or decreased by a percentage. Understand how to use a repeated multiplier to work out an amount that has undergone more than one % change. Understand how to use the unitary method to work out an original amount where there has been more than one percentage change (e.g. a decrease of a given percentage and then an increase of a given percentage; or a decrease of a given percentage and then another decrease of a given percentage). Use mental strategies to solve percentage problems. Investigate mental strategies for solving problems involving decimal percentages, and make decisions about most efficient method to use for different problems.		reasoning, where necessary. Plenary style questions - White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	recall and low stakes quizzing. Please see the Resources section for available materials on skills practice and worded style questions for progression 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 addressing any consistent errors, encourage and explore topic links and supported multistep problems		Knowledge Recall Lesson – Unit 10 – Shared area. Pearson's KS3 Maths Textbook: Problem solving, Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Unit 10 Knowledge Quiz – Shared area.		
	RECAP/REVISION OF Topic 3/Unit 2 - Area and Volume – Revision (Approximately 3 weeks)						
G12 G13 G14 G16	How do we measure the size of a 2D shape or 3D solid? KS2, Yr7 Ch4	****Students have already covered this content in term 2. Teachers are to refer to the scheme of learning and address any gaps in knowledge**** **This can be strengthened and extended with:** **- Purposeful drills** **- Problem solving** **- Algebraic notation** **- Further decimal and fraction use** **- Advanced calculator usage** **- Exploring the idea of bounds**		Area, volume, units, parallelogram, trapezium, cuboid, prism, perpendicular, base, height, triangle, isosceles, composite, surface, net, plan, elevation, isometric, cube, face, edge, vertex, metric, imperial, hectare	Pupils are expected to complete purposeful exercises and repeated practice on: • Finding the area of different shapes. • Finding the area of compound shapes. • Finding the volume and surface area of 3D shapes • Finding the volume and surface area of 3D shapes • Drawing and recognising 2D representations of 3D solids. • Metric unit conversions.	• Pearson's Pi2 Ex2 • Pearson's Theta2 Ex2 • Person's Delta2 Ex3 • Support/Core/Extend KS3 book Year 8 Ch2 • Cambridge Essentials support/core GMCh2 Key & exemplar questions – WRM Trapezia and Circles 3D solids and cardboard nets for visualisation. Multilink cubes Geometry skills - textbook generator Question Generators - MathsBot.com	

				Practical problems involving area and volume with a real-life context including money. Multistep problems in a range of scenarios with reasoning, where necessary, including equal areas, working backwards and compound areas. Ensure written work is of a high quality. Plenary style questions - White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	Active Learn > KS3 Maths Progress > Resources > Ch2 PDFs Year 8 Term 1 Knowledge Organiser for key terms, recall and low stakes quiz. See Resources section for available materials on skills practice and worded style questions for progression and assessment.	
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

Unit 1

Place value errors, such as not aligning columns correctly when adding or subtracting. Check that students know to align columns from the right for whole numbers, and that they set their working out clearly

Not using correct order of operations. Emphasise that any calculations in brackets must be evaluated first.

0. 16 ÷ 2 = 0.8 (use long division to demonstrate keeping the decimal point/place value).

Students think that –2 always means subtract 2. Use the number line to demonstrate the two uses of the – sign. –2 is the name of a number on the number line. To subtract 2 from 5, write 5 – 2. To subtract 2 from –2 write –2 – 2. To multiply 3 by –2 write 3 × –2 or 3 × (–2) to make it absolutely clear that there is no subtraction.

Students misuse rules such as "two negatives make a positive", e.g. –3 – 7 = 21 Explain that the rule only works when multiplying, dividing and for two adjacent + or – signs. There is no × sign in the calculation –3 – 7 so the rule cannot be used. Calculate –3 – 7 using the number line.

Students think that the square root of a number is half of the number and cube root is a third of the number. Use a function machine diagram to demonstrate squares, square roots, cubes and cube roots.

Students may not completely decompose a number into its prime factors. Refer the student to a list of prime numbers.
Students may count too many or too few prime factors of a decomposition when finding the LCM, or simply multiply the two numbers together to find the LCM. Show that the decomposed LCM of 12 and 18 ($36 = 2 \times 2 \times 3 \times 3$) contains the primes of each decomposed number ($12 = 2 \times 2 \times 3$ and $18 = 2 \times 3 \times 3$) and no more than primes than are necessary. Demonstrate that simply multiplying the two numbers together gives a number bigger than the LCM.
Writing the square of a negative number as negative. Encourage students to write the square out in full and apply the rules for multiplying negative numbers

Unit 2

Forgetting to use the ½ in the formula for the area of a triangle. Resolve pictorially by drawing in the rectangle that contains the triangle to show that the area of the rectangle needs to be halved to find the area of the triangle.
When calculating the area of a parallelogram, using the slant height instead of the perpendicular height.
Finding volume instead of surface area. Resolve by reminding students to read the question carefully. If they're asked to find area, they need to think of the net of the box, as it's the area of cardboard that is needed. If they're asked to find the volume it's the space that the shape takes up.
Not finding the area of all 6 faces. Resolve by making a sketch of the net of the cube/cuboid and writing the area of each face on the net so that none are forgotten.
Confusion of vocabulary for faces, edges and vertices. Students can remember that Faces are Flat, or that the V of Vertices has a vertex at the bottom.
Students often orient isometric paper incorrectly. Check the distance between vertically aligned dots is shorter than the distance between horizontally aligned dots.
When 'counting cubes' to find the volume of a cuboid or shape made from cubes, students often omit any 'hidden' cubes. Encourage students to visualise the full shape.
Units used in the answer must match units given in question. Students also sometimes incorrectly use length or area units rather than volume units.
Pupils multiply by 10, 100, 1000 instead of dividing. Encourage students to use common sense to check calculations.
Forgetting to calculate the cross-sectional area correctly, e.g. forgetting to divide by 2 for a triangle or not being able to calculate the area of a trapezium.
Confusing the formula for the area of a circle with the formula for the circumference of a circle.
Applying Pythagoras' theorem to triangles that are not right-angled.

Unit 3

Students may have difficulties finding the size of equal class intervals. Encourage them to identify the minimum and maximum values that would lie in a class interval to find the size.
Not recognising the modal class as being the most frequent group for grouped data.
Joining bars for discrete data.
Lack of understanding that a pie chart represents proportions rather than actual numbers.
Drawing all angles from first radius, rather than from edge of previous sector. Encourage students to label each sector with what it shows, as they complete it, to help reinforce that the sector is now finished and they should start a new one for the next data item. Just as when eating pizza, you don't go back to a 'slice' once you have finished it.
Calculating the mean – dividing by the number of rows in the table, not by the total frequency. Pictorial Use bar model e.g. for Q2
Not ordering the leaves. Emphasise that drawing the diagram is a two-step process – Step 1 decide on the stem, write in the leaves as you cross them off the data list, Step 2 copy out neatly, with the leaves in order.
Writing only the 'leaf' as the mode or median. Ask Is your answer sensible? Is it one of the data values? e.g. if the student says the modal parking time is 2 minutes, ask Did anyone park for only 2 minutes?
Not being able to decide which is the most appropriate average to use in an 'open' question. Suggest this strategy: work out all the averages. Decide which is closer to most of the data values.
Thinking the line of best fit has to go through zero. See the discussion after Q6. Emphasise that the line has to go through the middle of the data points and follow the shape of the data distribution.

Unit 4

Students may write $5x - 4x = 1x$, or $4x - 5x = -1x$. Although it is not incorrect, explain to students that it is not necessary to write the 1. The convention is to write $5x - 4x = x$, or $4x - 5x = -x$
Combining unlike terms e.g. $2p + 3r = 5pr$. Resolve using a concrete activity such as using pens and rulers to represent p and r. Show that $2p + 3p$ simplifies to $5p$ and that $2r + 3r$ simplifies to $5r$, but that $2p + 3r$ cannot be simplified as you are not adding the same types of items.
Not using the inverse when finding inputs. Encourage students to draw the inverse function machine, and also to check their answer by putting it through the original function machine – do they get the given output?
When expanding brackets, multiplying only the first term by the number outside the bracket, e.g. $4(x + 2) = 4x + 2$. Concrete Resolve using an activity such as using a box to represent a bracket.
Students may not realise that p can be written p^1. Write $2^3 \div 2^2 = 2^{3-2} = 2^1$ and $2^3 \div 2^2 = 8 \div 4 = 2$ showing that $2^1 = 2$. This works for any number, so it also works for a letter because in mathematics a letter is a number. Write $a^1 = a$
Students only change the sign of the first term when multiplying a bracket by a negative quantity. Demonstrate using numbers, e.g. $-2 \times (5 + 1)$ by expanding and using BIDMAS and then $-2 \times (5 - 1)$
Students only partially factorise an expression. For example, $12a + 16b = 2(6a + 8b)$ Can you factorise the expression inside the brackets? Write $2(6a + 8b) = 2 \times (2 \times (3a + 4b))$ and simplify. Point out that 4 is the HCF of 12 and 16.
Students divide before adding/subtracting from both sides of a two-step equation. Use function machines to demonstrate the order of working.
When expanding brackets, making errors with the signs. Display the rules for multiplying with negative numbers.
Getting the signs wrong when substituting a negative value. Display the rules for multiplying with negative numbers. Encourage students to write their working out in full
Getting the signs wrong when expanding brackets to solve an equation. Encourage students to write negative numbers in a different colour (or circle them), to help them see the sign as 'part of' the number.

Unit 5

Only checking the first difference and assuming the sequence continues in the same way. Assuming a sequence increases linearly.
Accuracy in plotting graphs – uneven intervals or incorrectly marked scales; poor or no labelling. Produce a graph with a number of exaggerated errors for pupils to spot.
Thinking the gradient is found by dividing the change in x by the change in y rather than the other way around. Gradient = change in vertical / change in horizontal so deciding a phrase to aid memory may help:

Thinking that lines parallel to x-axis will be x = c rather than y = c. Practise showing lines such as x = 4, x = –2 y = 10, y = –6 with their arm at the right distance from the origin (x = m, hand and forearm level) (y = m, hand and forearm upright), as this means moving them up and down for the x = and left to right of centre for the y=.
Working out a gradient when the scales are different on each axis. Confusing negative and positive gradients.
Incorrectly substituting into equations involving negatives.

Unit 6

When subtracting, writing the wrong number on the top of the calculation.
Forgetting to divide by 10 / 100 after carrying out the calculation.
Assuming 3.09 is larger than 3.4, misunderstanding place value. Not adding zero placeholders to help with calculations. Confusing ascending and descending.
Not correctly lining up the numbers when adding or subtracting.
Students often confuse < and >. Open end points to larger number.
Failure to change both numbers in a decimal division. Encourage students to see this as an equivalent calculation.
Not understanding that ratios can be simplified like fractions.
Failure to understand unit ratios as being a special decimal ratio where one quantity is 1.
Students might need help to solve problems suggested as they are in engineering contexts that may be unfamiliar. Be clear about how you would solve them in advance.
Inability to interpret a unit ratio i.e. reversing the meaning. Students should rehearse saying out loud what the unit ratio means.

Unit 7

Students use the wrong scale of a protractor. Demonstrate reading an angle from 0°. Encourage students to check that their reading is reasonable.
Students assume two angles are vertically opposite without using a ruler to check straight lines. Demonstrate using a diagram similar to Q3c.
Students fail to realise that alternate angles can be obtuse. Use a diagram to show that, for every pair of acute alternate angles, there is a pair of obtuse alternate angles (giving a stretched Z).
Students do not use the properties of triangles to help solve a problem. Advise students to identify known triangles when looking at a diagram for the first time. They should look for equal sides and angles, right angles and shape names in the question to identify isosceles, equilateral and right-angled triangles.
Students may assume that a polygon is regular. Emphasise that polygons must be assumed to be irregular unless the question states otherwise or the diagram shows all sides equal or all angles equal (or you can show them to be equal).
Students do not give enough reasons for their calculations. Point out that although they may get the correct answer, they may lose marks because they have not presented a reasoned argument.

Unit 8

Not simplifying fractions fully. Colour the fractions on squared paper, in blocks of rows and columns, to try to then visualise a simpler fraction
Some students think that you can only simplify by halving, or if you start by halving you have to continue by halving instead of using a different divisor.
Adding or subtracting the denominator as well as the numerator.
Not knowing which denominator to choose. Students should be encouraged to try to find the LCM of the two denominators. Alternatively, using the product of the denominators always works, but the answer will often need simplifying.
Not understanding that fractions, decimals and percentage are different ways of recording the same information.
Not making the fractions have equal denominators before calculating.
Not simplifying before / after multiplying fractions.

Unit 9

Writing probabilities as numbers less than 0 or greater than 1. Be careful to draw probability scales that do not continue beyond 0 or 1, and reinforce the fact that a probability of 0 represents impossibility and a probability of 1 represents certainty.
Understanding that likely / highly likely and unlikely/highly unlikely have specific mathematical meanings. Differentiate between probabilities of, e.g. rolling a 1 or a 2 on a dice (unlikely), and, e.g. winning the lottery (highly unlikely).
Thinking experimental probabilities are exact, or will always be the same if an experiment is repeated.
Making predictions based on a small number of trials. Encourage students to get into the habit of using the number of trials to comment on the reliability of their estimates.
Students do not list all of the outcomes, e.g. miss out identical outcomes. Use the spinner in Q5 to list the 5 possible outcomes: red, red, blue, blue, blue. The spinner has 5 ways to land, so there are 5 possible outcomes, even though they look the same when written.
Students think that estimated probability is less accurate than theoretical probability. Explain that in real life probabilities are best estimated based on past data. Theoretical probability can be used to model real life but will only be an approximation.
Students assume that a dice / spinner is fair without being told it is, e.g. an ordinary dice, a fair spinner. Warn students that they should not assume fairness unless the question says so. Some probability experiments are carried out to see if a spinner or dice is fair.
Students are confused about when to add or multiply probabilities. Remind students that P(A or B) is found by adding the probabilities, e.g. rolling a 2 or a 5 with a dice (+ =). P(A and B) is found by multiplying probabilities, e.g. flipping Heads with a coin twice (× =).
Students ignore the fact that two events are dependent. Use a bag of say 3 red and 2 blue coloured counters to demonstrate that the probabilities change when one counter is removed.

Unit 10

Converting hours and minutes into decimal numbers of hours, e.g. thinking that 2 hours 40 minutes is the same as 2.4 hours.
Assuming that division always makes things smaller.
Students may not notice that a decimal is recurring if the repeated pattern is very long . Not using dot notation correctly.
Students have difficulty increasing or decreasing by complex percentages, e.g. 3%, 1.5%. Find 1% first, then you can work out any number of percent.
Students do not know whether to multiply or divide by a multiplier. Encourage students to check that their answer makes sense, e.g. a smaller amount after a reduction.
Students think that comparing proportions can answer questions comparing amounts. Clarify using a simple example, e.g. 10% of £20 compared to 5% of £60.
Place value errors in the algebra when changing recurring decimals to fractions.
Confusion over reverse percentages.

KS3 – 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. They will later build into 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 KS3 Textbook Series 1 and 2 - ActiveLearn (pearsonactivelearn.com)
- Pearson's KS3 Practice homework sheets - 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.
- 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.
- White Rose Secondary KS3 SOL - Secondary SOL | White Rose Maths | FREE Maths Teaching Resources
- Additional Maths Blogs and other online resources include:

Solvemymaths	Mathed Up
Resouraholic	Miss B resources
Colleenyoung.wordpress	Boss Maths
missquinnmaths.wordpress	Nrich
Just Maths	Pret Homework

BBC Bitesize

Assessments/ Quizzes

Through KS3, pupils are assessed regularly to monitor progress, understanding and make predictions within lessons. Assessment of Learning takes place in the form of:

- **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 exam. 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.*

- **End of Year Assessments**

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
- Research or Investigative Tasks.

It is expected that KS3 students will undertake a 30- 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, 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 (The Abbey Lens). 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.