THE ABBEY SCHOOL
A BUSINESS & ENTERPRISE ACADEMY

Year 7
Scheme of Learning

Mathematics

Subject leader: K Ellender

Topic overview for Year 7					
Term 1	**Term 2**	**Term 3**	**Term 4**	**Term 5**	**Term 6**
Unit 0. Maths Introductions 0.a Rolling numbers 0.b Practical Skills 0.c Calculator Skills Numeracy assessment Setting. **Unit 2. Number Skills** 2.a Addition and subtraction 2.b Multiplication 2.c Division 2.d Money and time 2.e Negative numbers 2f. Factors, Multiples, Primes 2g. Square Numbers Knowledge Recall / Quiz	**Unit 3. Expressions, Functions, Formulae** 3.a Functions 3.b Simplifying expressions 3.c Writing expressions 3.d Substituting into formulae 3.e Writing formulae Knowledge Recall / Quiz **Unit 1. Displaying and Analysing Data** 1.a Displaying data 1.b Grouping data 1.c Line graphs and more bar charts 1.d Mode, median, range 1.e Averages and comparing data Knowledge Recall / Quiz	**Unit 4. Decimals and Measures** 4.a Decimals and rounding 4.b Length, mass and capacity 4.c Scales and measures 4.d Working with decimals 4.e Perimeter 4.f Area 4.g More units of measure Knowledge Recall / Quiz **Unit 5. Fractions and percentages** 5.a Comparing and simplifying fractions *Continued in Term 4 …*	**Continued…** 5.b Working with fractions 5.c Fractions and decimals 5.d Understanding percentages 5.e Percentages of amounts Knowledge Recall / Quiz **Unit 6. Probability** 6.1 The language of probability 6.2 Calculating probability 6.3 More probability calculations 6.4 Experimental probability 6.5 Expected outcomes Knowledge Recall / Quiz	**Unit 7. Ratio and proportion** 7.a Writing ratios 7.b Using ratio 7.c Direct proportion 7.d Ratios, proportions and fractions 7.e Proportions and percentages Knowledge Recall / Quiz **Unit 8. Lines and angles** 8.a Measuring and drawing angles 8.b Lines, angles and triangles 8.c Drawing triangles accurately 8.d Calculating angles 8.e Angles in a triangle 8.f Quadrilaterals Knowledge Recall / Quiz	**Unit 9. Sequences and graphs** 9.1 Sequences 9.2 Pattern sequences 9.4 Extending sequences 9.6 Position-to-term rules 9.3 Coordinates and midpoints 9.5 Straight-line graphs Knowledge Recall / Quiz **Unit 10. Transformations** 10.1 Congruency and enlargements 10.2 Symmetry 10.3 Reflection 10.4 Rotation 10.5 Translations and combined transformations Knowledge Recall / Quiz

Vital prerequisites	**Vital prerequisites**	**Vital prerequisites**	**Vital prerequisites**	**Vital prerequisites**	**Vital prerequisites**
Multiply multi-digits numbers up to 4 digits Divide numbers up to 4 digits by a two-digit whole number Perform mental calculations Identify common factors, multiples and primes Have some knowledge of the order of operations. Solve multi-step addition and subtraction problems	Students should be familiar with using simple formulae Express missing number problems algebraically Find pairs of numbers that satisfy an equation with two unknowns Interpret and construct pie charts and line graphs Calculate and interpret the mean as an average	Identify that value of each digit in numbers given to 3 decimal places and multiply numbers by 10, 100 and 1000. Multiply whole numbers by a number with two decimal places Round to specific degrees of accuracy Use common factors to simplify a fraction. Compare and order fractions.	Add, subtract and multiply with any fractions. Divide proper fractions by whole numbers. Associate a fraction with its decimal equivalent. Solve problems involving the calculation of percentages that are multiples of 5%. No pre-requisites for probability.	Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts Solve problems involving similar shapes where the scale factor is known or can be found. Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals and regular polygons. Recognise angles where they meet at a point, are on a straight line, or are vertically opposite and find missing angles.	Generate and describe linear number sequences Describe positions on the full coordinate grid (all 4 quadrants). Draw and translate shapes on the coordinate plane and reflect them in the axes. Solve problems involving similar shapes where the scale factor is known or can be found.
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?**
<u>Unit 2</u> Simple addition and subtraction skills are vital to all aspects of the mathematics curriculum. Problems involving money and time are vital for every-day life. Squared numbers are needed for other topics in later key stages such as Pythagoras, laws of indices and algebra.	**<u>Unit 3</u>** Leads on to Year 8 – Unit 4 Expressions and Equations which involves factorising expressions, solving one and two step equations and more complex algebraic skills Leads into more complex GCSE topics such as expanding double brackets, forming and solving algebraic equations and algebraic fraction problems. **<u>Unit 1</u>** Links to Year 8 work. Unit 3 – Statistics, Graphs and Charts. Students need a solid understanding in year 7 to move onto this unit. Links to GCSE include averages from a table and scatter graphs.	**<u>Unit 4</u>** Links to Year 8 – Unit 6 Decimals. Year 8 focuses more on the idea of ratio with decimals, so a solid understanding of decimals is needed. Furthermore, decimals come up in other areas such as standard form, error intervals and FDP.	**<u>Unit 5</u>** Links to Year 8 – Unit 8 and Unit 10 which include calculations with fractions and FDP calculations. Year 7 focuses of basic arithmetic and percentages of amounts whereas Year 8 focuses more on FDP equivalence and proportion. Fluency with fractions and percentage allow students to solve harder GCSE worded problems. Links to interest, multipliers and algebraic fractions at GCSE level. **<u>Unit 6</u>** Not seen in Year 8. Students are introduced to probability to set them up for success in Year 10. Probability is next seen in year 10 due to its abstract nature. Students are expected to have a basic understanding of single events and can describe probability in words.	**<u>Unit 7</u>** Ratio and proportion make up a large part of the overall GCSE so a strong understanding is needed early on. Links to Unit 5/9 in Terms 3 and 4 of Year 8. Direct proportion graphs are looked at. Later in term 4, ratio and proportions with decimals are a large focus (Unit 6) **<u>Unit 8</u>** Used as a foundation for a similar unit in Year 8. Unit 7 Lines and angles. Students are expected to know basic angle facts and in Year 8 they begin to look at angles in parallel lines, angles in polygons and solving harder geometric problems Links to GCSE problems involving circle theorems (H) and harder angle problems such as trigonometry.	**<u>Unit 9</u>** Links to real-life graphs and straight-line graphs (Unit 5/9) in Year 8. Harder nth term problems such as decreasing sequences and geometric also need unit 9 as a pre-requisite. Sequences are a common theme in GCSE questions and require a lot of attention in Year 7. Geometric sequences are seen in Year 9 and finding their nth term. Links to plotting quadratic graphs in year 9. **<u>Unit 10</u>** Transformations not seen again unit Year 10 so is left until the end of the Year to minimise the length of time students do not engage with transformations. Links to Year 10 Term 6 where describing transformations is a focus. In GCSE, we also look at

					combining transformations and invariant points.

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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.

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 0: Maths Introductions (Approximately 2 weeks)						
N1 N2 N3 N4 N6 N13 N14 N15	What facts and skills do I need to begin my journey in Maths in The Abbey School? KS2 - Times tables	0.a Rolling Numbers and tables. 0.b Practical Skills 0.c Calculator Skills	Times tables practice, drills and reinforcements. Rolling numbers verbal practice Multiplication and division Relating calculations through times tables e.g. 8 x 16 = 8 x 8 x 2 etc. Use correct letting and label notation. Recognise parallel and perpendicular lines and lines of equal length. Measure lines segments and angles. Classify angles. Drawing line segments and geometric figures, angles and circles of a given radius Drawing accurate mathematical diagrams according to a given set of instructions . Use of a scientific calculator and the main features required in KS3 to undertaken calculations. Interpret the display on a scientific calculator. Reset a scientific calculator. Numeracy assessment. Baseline assessment.	Product, divide, multiply, inverse, equivalent approximately, cm, mm, protractor, compass, crosshairs, baseline, vertex, acute, obtuse, reflex, measure, accuracy, precision, 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: • Times tables • Using related times tables • Calculations including multiplication and division • Measuring lines and angles accurately • Drawing lines, circles and angles accurately • Use of a calculator • Building confidence in using equipment.	**Introduction lessons can be found in the shared area.** Compasses Rulers Protractors Calculators Times tables - Question Generators - MathsBot.com Times tables worksheets printable - Math worksheets Multiplication grids - https://mathsbot.com/activities/drills Key & exemplar questions – WRM - Constructions and measuring WRM - KS2 Properties of shapes WRM - Measuring perimeter Using a protractor Year 7 Knowledge Recall Page for key terms, recall and low stakes quizzing.	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. **Numeracy Across the Curriculum –** Discuss with students the use of numeracy

					Aim for proficiency and ensure written work is of high quality.	See Resources section for available materials on skills practice and worded style questions for progression and assessment.	across all other subjects as they start new subjects and lessons.
	Topic 1: Unit 2 - Number Skills (Approximately 4 weeks)						
N1 N2 N3 N4 N6 N13 N14 N15	How do you calculate accurately with positive and negative numbers?  KS2,	2.a Addition and subtraction 2.b Multiplication 2.c Division 2.d Money and time	Use a written method to add and subtract whole numbers. Round whole numbers to powers of 10. Use estimation to check answers. Understand inverse operations (addition and subtraction) and use it to check answers. Recognise multiples of 2, 5, 10 and 25. Use a written method to multiply whole numbers. Use estimation to check an answer to a multiplication. Use mental and written strategies for multiplication. Decide whether you can divide by 2, 5, 9 or 10 Divide whole numbers using a written method. Use inverse operations to check answers. Divide a 3-digit integer by a single or 2-digit integer. Know what it means if a division calculation has a remainder and revert to decimal answers. Use multiplication facts up to 10 × 10 up to 10 x 10 and the laws of arithmetic to do mental multiplication and division. Multiply and divide by 10, 100 and 1000 Know and use the priority of operations. Understand how multiplying by 10, 100, 1000, etc relates to our place value system and why this means we have a decimal system. Round money to the nearest pound or penny. Use a calculator to solve problems involving money and time. Order positive and negative numbers.	Sum, sequence, rounding, approximation, estimate, difference, subtract, halve, rise, increase, decrease, fall, priority of operations, BIDMAS, partitioning, inverse, divisible, multiple, See command words	Pupils are expected to complete drilling exercises and repeated practice on: • Times tables • Addition • Subtraction • Multiplication • Division • Rounding • Estimating calculations • Money calculations • Operations with negative numbers • HCF and LCM Practical problems involving operations in real life contexts and multistep problems in a range of scenarios such as money and cost with reasoning, where necessary. Aim for proficiency of operations and ensure written work is of a high quality. Ensure modelled work is clear and consistent in approach.	• Support/core/extend KS3 book year 7 Ch2 • Pearson's Pi1 Ch2 • Pearson's Theta1 Ch2 • Pearson's Delta1 Ch2 • Cambridge Essentials 7 support/core/extension NCh1-4 Key & exemplar questions – WRM - Add and Subtract WRM - Multiply and divide 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	**SMSC and BV** Opportunities to discuss and investigate the history and evolution of the number system. This can include: BBC Two - History of Maths, Half Term investigation. **Gatsby Benchmarks: Careers & Personal Finance** Use real-life contexts with basic integer and money 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)

		2.e Negative numbers	Add and subtract positive and negative numbers. Begin to multiply with negative numbers. Divide with negative numbers.		Plenary style questions - White Rose Maths - Assessment Papers MathsBox > Topic resources > 4 Questions / Exit tickets	Patterns (mathsbot.com) Active Learn > KS3 Maths Progress > Resources > Ch2 PDFs Year 7 Term 1-2 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.	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 lessons as examples and practice. **Numeracy Across the Curriculum –** Discuss with students the use of numeracy across all other subjects as they settle into new subjects and lessons
	What other types of numbers can I calculate with? KS2	2.f Factors, multiples and primes 2.g Square numbers	Recognise prime numbers. Decompose a number into prime factors. Work out multiples and find the LCM Find all the factor pairs for any whole number. Identify common factors, the HCF and LCM Recognise square numbers. Use a calculator to find squares and square roots. Use the priority of operations including powers. Use index form for powers. Do mental calculations with squares and roots. Estimate square roots that give decimal answers (Do not stray into surds!) Solve word problems using square and cube roots. Estimate answers to complex calculations.	Factor, common factors, prime, HCF, common multiples, LCM, recognise and use square numbers, square roots and triangle numbers, index notation, power, index, estimate See command words	Pupils are expected to complete drilling exercises and repeated practice on: • Times tables • Operations with negative numbers • HCF and LCM Practical problems involving operations in real life contexts and multistep problems in a range of scenarios such as money and cost with reasoning, where necessary. Aim for proficiency of operations and ensure written work is of a high quality. Ensure modelled work is clear and consistent in approach.	• Support/core/extend KS3 book year 7 Ch2 • Pearson's Pi1 Ch2 • Pearson's Theta1 Ch2 • Pearson's Delta1 Ch2 • Cambridge Essentials 7 support/core/extension NCh1-4 Key & exemplar questions – WRM - Multiples & factors Manipulatives for prime number representations and multiplication Prime Factor Tiles (mathsbot.com) Active Learn > KS3 Maths Progress > Resources > Ch2 PDFs	

					Plenary style questions - White Rose Maths - Assessment Papers MathsBox > Topic resources > 4 Questions / Exit tickets	Year 7 Term 2 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.	
		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 progress second edition support/core/extend textbook Ch2: Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		• Knowledge Quiz – Shared area.		
Assessments for the year group will take place in Week 3 of each term, followed by feedback and focussed Pupil Improvement Time							
Term 2							
	Topic 2: Unit 3 - Expressions, functions and formulae (Approximately 3 weeks)						
A1 A2 A3 A4 A7	What is algebra? KS2	3.a Functions 3.b Simplifying expressions 1 3.c Writing expressions	Find outputs of simple functions written in words and using symbols. Describe simple functions in words. Understand that a function is a relationship that maps one set of numbers on to another, explaining why the order of the operations is important. (eg x 3 + 1 is not usually the same as + 1 x 3). Simplify linear algebraic expressions by collecting like terms. Multiply and divide algebraic terms. Use brackets with numbers and letters. Apply the rules of negative numbers when simplifying expressions. Write expressions from word descriptions using addition, subtraction and multiplication. Write expressions including division. Write expressions to represent function machines.	Function, input, output, expression, substitute, formula, simplify, like terms, expand 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: • Simplifying expressions • Expanding brackets	• Support/core/extend KS3 book year 7 Ch3 • Pearson's Pi1 Ch3 • Pearson's Theta1 Ch3 • Pearson's Delta1 Ch3 • Cambridge Essentials 7 support/core/extension ACh1-3 Year 7 Term 2 Knowledge Organiser for key terms, recall and low stakes quizzing. Key & exemplar questions –	Students should be introduced to the idea of algebra skills being linked to problem solving skills in a variety of context at this early stage. It is often during this unit that the question surrounding the purpose of this mathematical area is first raised. Maths, Why Bother? |

		3.d Substituting into formulae 3.e Writing formulae	Begin to understand writing an algebraic expression may be easier than explaining a rule in words. Understand that a formula can be seen as a rule that tells you how to do a calculation (eg length x width). Substitute positive integers into simple formulae written in words. Substitute positive integers into formulae written with letters. Substitute negative integers into formulae written with letters. Substitute into expressions involving powers. Understand the difference in 'variable, term, expression and formula'. Write simple formulae in words. Write simple formulae using letter symbols.		• Substitution into expressions and formulae • Writing formulae. Practical problems involving using algebraic expressions to represent a situation and use it as a process to simplify a scenario representation. Aim for proficiency of operations and ensure written work is of a high quality. Ensure modelled work is clear and consistent in approach. Plenary style questions – White Rose Maths - Assessment Papers MathsBox > Topic resources > 4 Questions / Exit tickets	WRM -Algebraic-Notation Manipulatives for algebraic representations and multiplication - Algebra Tiles (mathsbot.com) Algebra Discs (mathsbot.com) Active Learn > KS3 Maths Progress > Resources > Ch3 PDFs Please see the Resources section for available materials on skills practice and worded style questions for progression and assessment..	MYPATH Careers Resources (mypathcareersuk.com)
		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 progress second edition support/core/extend textbook Ch3: Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Knowledge Quiz – Shared area.		
	Topic 3: Unit 1 - Analysing and Displaying Data (Approximately 3 weeks)						
S2 S4	How can we represent the world we live in with graphs and charts? KS2	1.a Displaying data 1.b Grouping data	Read pictograms Draw pictograms Read and construct tally charts and frequency tables. Read and construct grouped tally charts and frequency tables.	Pictogram, data, key, bar chart, bar-line chart, tally chart, frequency, frequency table, groups, classes, grouped frequency table, dual bar chart, compound bar chart	Pupils are expected to complete purposeful exercises and repeated practice on: • Drawing different graphs and charts.	• Support/core/extend KS3 book year 7 Ch1 • Pearson's Pi1 Ch1 • Pearson's Theta1 Ch1 • Pearson's Delta1 Ch1	**SMSC and BV** Initial opportunities to discuss data connections to individual liberty and the rule of law.

		1.c Line graphs and more bar charts	An opportunity to gather class data – eye colour, hair colour, siblings, primary school etc. Read and draw bar charts. Read and construct grouped bar charts. Read and draw a dual bar chart. Read and draw a compound bar chart. Read and draw a line graph. Read and draw real life graphs using class data. ** If setting of new students takes longer than expected, it will be necessary to complete the remainder of the unit scheduled at the end of Term 2 (Averages and Range). **	See command words	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 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 MathsBox > Topic resources > 4 Questions / Exit tickets	• Cambridge Essentials 7 SCh1 Year 7 Term 1 Knowledge Organiser for key terms, recall and low stakes quizzing. Key & exemplar questions – WRM - Representing data Pre-printed axis and graphs where appropriate. Active Learn > KS3 Maths Progress > Resources > Ch1 PDFs • 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 Home - Office for National Statistics (ons.gov.uk) Use recent and relevant statistical representations in the media for discussion and context. **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.
S2 S4	What is meant by 'Average'? KS2	1.d Mode, median and range 1.e Averages and comparing data	Find the mode of a set of data. Find the median of a set of data (odd and even). Find the range of a set of data. Calculate the mean of a set of values. Find the mode/modal class from a graph. Find the range from a graph. . Find the mode/modal class from a table. Find the range from a table. Find the mean from a table. Understand what an average is a measure of, and what it does and doesn't represent. Compare two data sets using an average and range.	Mode, values, modal class, range, median, mean, average, compare See command words	Pupils are expected to complete purposeful exercises and repeated practice on: • Calculating the mode • Calculating the median • Calculating the mean • Calculating the range • Averages from graphs • Averages from tables	• Support/core/extend KS3 book year 7 Ch1 • Pearson's Pi1 Ch1 • Pearson's Theta1 Ch1 • Pearson's Delta1 Ch1 • Cambridge Essentials 7 support/core/extension SCh1 Year 7 Term 2 Knowledge Organiser for key terms, recall and low stakes quizzing.	

			Understand which average is most appropriate. Understand how to choose the best representation for different sets of data.		Practical problems involving averages from real life data. Ensure written work is of a high quality and encourage students to SHAPE answers when explaining. Plenary style questions – White Rose Maths - Assessment Papers MathsBox > Topic resources > 4 Questions / Exit tickets	Active Learn > KS3 Maths Progress > Resources > Ch3 PDFs Please see the Resources section for available materials on practice questions	
		Knowledge Recall and Quiz.	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 progress second edition support/core/extend textbook Ch1: Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Knowledge Quiz – Shared area.		
Assessments for the year group will take place in Week 3 of each term, followed by feedback and focussed Pupil Improvement Time							
Term 3							
	Topic 4: Decimals and measures (Approximately 5 weeks)						
N1 N2 N13 N15 R1 R2 G14 G15 G16	How do we calculate with decimals? KS2	4.a Decimals and rounding 4.b Length, mass and capacity	Read and write numbers in figures and words. Write decimals in order of size. Round decimals to the nearest whole number and to one and two decimal places. Round decimals to make estimates of calculations. Understand how to choose suitable numbers to round to when estimating an answer to a calculation (and this is not always rounding up or down to the nearest whole number e.g square roots). Choose units to measure length, mass, capacity. Convert metric units of length, mass, capacity.	Place value, ascending, descending, decimal place, 1d.p, Length, millimetre (mm), centimetre (cm), metre (m), kilometre (km), mass, gram (g), kilogram (kg), capacity, millilitre (ml), litre (l), estimate, approximate 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	• Support/core/extend KS3 book year 7 Ch4 • Pearson's Pi1 Ch6 • Pearson's Theta1 Ch4 • Pearson's Delta1 Ch6 • Cambridge Essentials 7 support/core/extension GMCh3, NCh1,3	**Gatsby Benchmarks: Careers & Personal Finance** Use real-life contexts with shapes and their applications wherever possible in KS3 to help students to engage and

		4.c Scales and measures 4.d Working with decimals	Compare measurements by converting the units. Solve simple problems involving measurement units. Use scale diagrams. Read scales on a range of measuring equipment. Interpret metric measures displayed on a calculator. Understand decimal fractions of measures of time does not follow the same rules as metric units. Add and subtract decimals. Multiply and divide by 10, 100 and 1000. Multiply decimals using equivalent calculations. Multiply and divide decimals. Divide numbers that give decimal answers. Understand the inverse operations of multiplication and division in relation to place value decimal calculations.		exercises and repeated practice on: • Ordering decimals • Rounding decimals • Multiplying and dividing decimals by powers of 10 • Converting units • Operations with decimals • Finding the perimeter of different shapes • Finding the area of different shapes Practical problems involving decimals in real-life contexts. 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	Key & exemplar questions – WRM - Place Value WRM - Addition-and-Subtraction inc. decimals WRM - Multiplication-and-Division-inc. decimals Year 7 Term 3 Knowledge Organiser for key terms, recall and low stakes quizzing. Active Learn > KS3 Maths Progress > Resources > ch4 PDFs Please see the Resources section for available materials on skills practice and worded style questions for progression and assessment Please see the Resources section for available materials on practice questions	relate learning to everyday and working life. Key examples include design, decoration and costs. 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, incorporated within lessons as examples and practice.
	How do we measure the size of a 2D shape? KS2	4.e Perimeter 4.f Area 4.g More units of measure	Work out perimeters of rectangles and polygons. Calculate the perimeter of composite shapes made from rectangles and polygons. Solve perimeter problems. Understand how to deduce formulae for perimeters of different shapes. Find areas of shapes by counting squares. Find the area of rectangles and squares. Calculate the area of shapes made from rectangles. Choose suitable units to estimate length and area. Calculate the area of triangles and parallelograms. Solve problems involving area. Know why area is measured in square units, and length in linear units. Understand that shapes can have the same area, but different perimeters. Use metric and imperial units.	Triangle, Scalene, Isosceles, Equilateral, Quadrilateral, Square, Rectangle, regular polygon, perimeter, area, units See command words			

		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 progress second edition support/core/extend textbook Ch4: Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.	Knowledge Quiz – Shared area.		
	Topic 5: Fractions and percentages (Approximately 4 weeks)					
Begin topic and continue 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: Fractions and percentages (Approximately 4 weeks)					
N2 N8 N10 N12 R3 R9	What is a fraction and how are they used? KS2	5.a Comparing and simplifying fractions 5.b Working with fractions 5.c Fractions and decimals	Use fraction notation to describe parts of a shape. Compare simple fractions. Use a diagram to compare two or more simple fractions. Simplify fractions by dividing numerator and denominator by common factors. Identify equivalent fractions. Order fractions Know that, for unit fractions, the larger the denominator, the smaller the value of the fraction. Change an improper fraction to a mixed number. Add and subtract fractions. Calculate fractions of a quantity. Multiply fractions Understand inverse operations relating to fractions. Work with equivalent fractions and decimals. Write one quantity as a fraction of another. Understand that all 1, 2 and 3 place decimals are also fractions.	Fraction, numerator, denominator, unit fraction, improper fraction, mixed number, equivalent fractions, simplify cancelling, simplest form 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: • Comparing fractions • Simplifying fractions • Converting between mixed and improper fractions • Adding and subtracting fractions • Fractions of amounts	• Support/core/extend KS3 book year 7 Ch5 • Pearson's Pi1 Ch9 • Pearson's Theta1 Ch5 • Pearson's Delta1 Ch4 • Cambridge Essentials 7 support/core/extension NCh2-4 Year 7 Term 4 Knowledge Organiser for key terms, recall and low stakes quizzing. Key & exemplar questions – WRM - Fractions add and subtract WRM - FDPs WRM Fractions-and-Percentages-of-Amounts Manipulatives for fraction representations and relations to equivalents	**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 and percentage calculations wherever possible in KS3 to help students to engage and relate learning to everyday and working life. Maths, Why Bother? | MYPATH
	What is a percentage and how can we compare them to fractions and decimalss?	5.d Understanding percentages 5.e Percentages of amounts	Understand percentage as 'parts per 100'. Convert a percentage to a fraction or decimal. Work with equivalent FDPs. Calculate percentages.	Per cent, percentages See command words		

	KS2		Use different strategies to calculate with percentages. Introduce multipliers. Express one quantity as a percentage of another. Working with fractions and percentages that are >1 and what this means (ground work for % increase).		• Converting fractions, decimals and percentages • Percentages of amounts 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 reasoning, where necessary. Plenary style questions – White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	- Fraction Wall (mathsbot.com) Active Learn > KS3 Maths Progress > Resources > Ch5 PDFs Please see the Resources section for available materials on practice questions	Careers Resources (mypathcareers uk.com)
		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 – Shared area. Pearson's progress second edition support/core/extend textbook Ch5: Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Knowledge Quiz – Shared area.		
	Topic 6: Probability (Approximately 3 weeks)						
P3, P4, P6, P7, P8, P9	What is probability and how does it involve Maths?	6.a The language of probability 6.b Calculating probability	Use the language of probability. Use a probability scale with words. Understand the probability scale from 0 to 1. Know that a probability can be expressed as a fraction, decimal or percentage Know assigning numerical values to probabilities can help us compare them more accurately. Identify outcomes of an event and equally likely outcomes.	Probability scale, describe, impossible, unlikely, even chance, likely, certain, relative frequency, experimental probability See command words	Pupils are expected to complete purposeful exercises and repeated practice on: • Calculating simple probabilities • Showing probability on a number line • Solving more complex probabilities	• Pearson's Pi2 Ex10 • Pearson's Theta1 Ex6 • Person's Delta2 Ex8 • Support/Core/Extend KS3 book Year 7 Ch6 Key & exemplar questions –	**SMSC and BV** There may be opportunities to challenge ideas and support students to think critically and not simply accept what they are told. Use of statistics

		6.c More probability calculations 6.d Experimental probability 6.e Expected outcomes	Calculate probabilities based on equally likely outcomes. Use a probability scale from 0 to 1. Understand when to use words and values in probability questions. Write probabilities as fractions, decimals and percentages List all outcomes for single events systematically Use sample spaces for probability Placing basic data lists in to Venn Diagrams Calculating probabilities of sets, unions and intersections from Venn Diagrams Use probability notation. Calculate the probability of an event not happening. Calculate more complex probabilities. Understand that when there are outcomes A, B and C, P(A or B) = P(A) + P(B), and that P(A) + P(B) + P(C) =1, so P(C) = 1 - P(A or B). Calculate quantities and work out probabilities from frequency trees. Find a missing probability from a list or table including algebraic terms. Estimate probability based on experimental data. Calculate Relative Frequency and understand that this is also called the experimental probability Record data from a simple experiment. Make conclusions based on the results of an experiment. Understand why more trials lead to better estimate of probability. Use probability to estimate the expected number of outcomes. Apply probabilities from simple experimental data in simple situations. Understand that if an event has probability ⅓ then we expect it to happen 1 in 3 times, but that doesn't mean that it will happen 1 in 3 times.		Practical problems involving probability form experiments. 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	WRM - Sets and Probability WRM - Tables and Probability Active Learn > KS3 Maths Progress > Resources > Ch6 PDFs Year 7 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	and factual probability can be a very valuable way to show that claims and assertions should be critically analysed before being accepted. Equally, there may be times when discussions with students can broaden their outlook to develop their resilience. Home - Office for National Statistics (ons.gov.uk) **Gatsby Benchmarks: Careers** Use real-life contexts with probability 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 MathsTextbook: 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: Ratio and proportion (Approximately 3 weeks)						
R3 R4 R5 R7 R8	What is a ratio and how are they used? KS2	7.a Writing ratios 7.b Using ratios	Use ratio notation. Reduce a ratio to its simplest form. Reduce a three-part ratio to its simplest form Write ratios in the form of 1:n and n:1. Find equivalent ratios. Divide a quantity into two parts in a given ratio. Solve word problems involving ratios. Use ratios and measures. Understand the multiplicative nature of ratio. Combine individual ratios into a single ratio with a common value.	Unitary method, ratio, highest common factor, simplifying, share, divide, equivalent, direct proportion, fraction, percentage, multiple, multiply, divide, divisor 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: • Simplify ratio • Share into a ratio • Ratio problem solving • Calculate direct proportion values • Use fractions with ratios. • Use percentages with ratios. Practical problems involving fractions, decimals and percentages. Ensure written work is of a high quality and encourage students to	• Support/core/extend KS3 book year 7 Ch7 • Pearson's Theta1 Ch7 • Pearson's Delta1 Ch8 • Cambridge Essentials 7 support/core/extension NCh4-5 Key & exemplar questions – WRM - Ratio and Scale WRM - FDP equivalents WRM - Fractions and percentages Ratio 'bar method' manipulatives - Bar Modelling (mathsbot.com) Ratio shares manipulatives - Sharing in a ratio (mathsbot.com) Active Learn > KS3 Maths Progress > Resources > Ch7 PDFs Year 7 Term 5 Knowledge Organiser	**Gatsby Benchmarks: Careers** Use real-life contexts with ratios wherever possible in KS3 to help students to engage and relate learning to everyday and working life.
	What is proportion and how is it useful?	7.c Direct proportion 7.d Ratios, proportions and fractions 7.e Proportions and percentages	Use direct proportion in simple contexts. Solve simple problems involving direct proportion. Use the unitary method to solve simple word problems involving direct proportion. Use fractions and to describe proportions. Use fractions to compare proportions. Understand the relationship between ratio and proportion. Use percentages to describe proportions. Use percentages to compare simple proportions. Understand and use the relationship between percentages, ratio and proportion.				

					SHAPE answers when explaining. Plenary style questions – White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	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 7 – Shared area. Pearson's progress second edition support/core/extend textbook Ch7: Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		Knowledge Quiz – Shared area.		
	Topic 8: Lines and angles (Approximately 3 weeks)						
G1 G3 G4 G15	What are the basic Geometry facts you need to know? KS2	8.a Measuring and drawing angles 8.b Lines, angles and triangles 8.c Drawing triangles accurately	Use a protractor to measure and draw angles. Revision from Term 1. Estimate the size of angles. Recognise acute, obtuse and reflex angles. Know and understand why a protractor has two scales, and which to use to measure a given angle. Recognise basic 2D shapes . Describe and label lines, angles and triangles. Identify angle and side properties of triangles. Classify triangles using more than one name, eg right angled scalene, and right angled isosceles. Understand how to draw a diagram from written instructions. Use a ruler and protractor to draw triangles accurately.	Rotate, degrees, angle, perpendicular, parallel acute, obtuse, reflex, construct, vertex, vertices, protractor, midpoint, interior, exterior, diagonal, quadrilateral, square, rectangle, parallelogram, rhombus, kite, trapezium, isosceles trapezium, arrowhead See command words	Pupils are expected to complete purposeful exercises and repeated practice on: • Estimating angles • Identifying angles and triangles • Calculating angles on a line and around a point • Vertically opposite angles • Calculating angles in a triangle • Calculating angles of quadrilaterals Ensure written work is of a high quality and encourage students to SHAPE answers when	• Support/core/extend KS3 book year 7 Ch8 • Pearson's Pi1 Ch7 • Pearson's Theta1 Ch8 • Pearson's Delta1 Ch5 • Cambridge Essentials 7 support/core/extension GMCh2-3 Key & exemplar questions – WRM -Constructing-and-Measuring WRM-Properties-of-Shape	

		8.d Calculating angles 8.e Angles in a triangle 8.f Quadrilaterals	Understand that you can draw more than one triangle with the same angles and different sides. Find missing angles on a line and around a point. Use vertically opposite angles. Solve problems involving angles. Use the rule for the sum of angles in a triangle. Calculate interior and exterior angles Solve angle problems involving triangles. Use angles in triangles to solve problems involving other shapes made up of triangles. Explore the relationship between exterior and interior angles of a triangle. Identify and name types of quadrilaterals. Use the rule for the sum of angles in a quadrilateral. Solve angle problems involving quadrilaterals. Use angles in quadrilaterals to solve problems involving other shapes made up of quadrilaterals.		explaining with reasoning. Plenary style questions – White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	Year 7 Term 5 Knowledge Organiser for key terms, recall and low stakes quizzing. Active Learn > KS3 Maths Progress > Resources > Ch8 PDFs Please see the Resources section for available materials on practice questions	
		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 progress second edition support/core/extend textbook Ch8: Check Up, Strengthen and Extend questions.		
		Knowledge Quiz	Knowledge Quiz and self-assessment.		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: Sequences and Graphs (Approximately 4 weeks)						
A8 A9 A23 A24 A25	KS2	9.a Sequences	Recognise, describe, continue number sequences. Generate terms of a sequence using a one-step term-to-term rule. Find missing terms in a sequence. Understand that an infinite sequence doesn't necessarily tend to +/- infinity. e.g. 1/2, 1/4, 1/8.	Sequence, term, term-to-term rule, ascending, descending, infinite, finite, arithmetic sequence, common difference, position to term, nth term	**Starter quizzes for the term should include:** **Focused accuracy drills including timetables** **Required prior knowledge** **Mixed skills practice**	• Support/core/extend KS3 book year 7 Ch9 • Pearson's Pi1 Ch4 • Pearson's Theta1 Ch9	

		9.b Pattern sequences 9.c Position-to-term rules	Recognise an arithmetic sequence and a geometric sequence. Continue and describe special sequences. Describe how a pattern sequence grows. Write and use number sequences to model real-life problems. Generate terms of a sequence using a position-to-term rule. Calculate the nth term of a sequence. Understand the connection between: nth term, term-to-term rule or common difference and first term (arithmetic sequences only).	See command words	**Knowledge gap support** **Look, cover, write, check.** Pupils are expected to complete purposeful exercises and repeated practice on: • Continue sequences • Generate sequences • Read and plot coordinates • Midpoint of a line segment • Recognise and name graphs parallel to the axes, include the graph of y=x Ensure written work is of a high quality and encourage students to SHAPE answers when explaining with reasoning. Plenary style questions – White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	• Pearson's Delta1 Ch10 • Cambridge Essentials 7 support/core/extension ACh1,4 GMCh2 Pre-printed axes. Key & exemplar questions – WRM Sequences WRM - Line graphs Please see the Resources section for available materials on skills practice and worded style questions for progression and assessment. Year 7 Term 6 Knowledge Organiser for key terms, recall and low stakes quizzing. Please see the Resources section for available materials on practice questions	
	How do you plot a straight line graph?	9.e Coordinates and midpoints 9.f Straight-line graphs	Read and plot coordinates. Generate and plot coordinates from a rule. Find the midpoint of a line segment. Know and understand that the midpoint is (mean of x coordinates, mean of y coordinates). Recognise, name, plot graphs parallel to the axes. Recognise, name and plot the graph of y = x. Recognise, name and plot the graph of y = -x. Plot straight line graphs using a table of values. Plot a straight-line graph for a basic equation. E.g. y = x+2, y = x - 4, y = 3x Draw graphs to represent relationships. Understand that the equation of a straight line generates an arithmetic sequence. Understand that when you plot an arithmetic sequence, it will always give a straight line. Relate this to 'going up or down in equal size steps' - and this is why we call them linear sequences.	Horizontal axis, vertical axis, maximum, minimum, coordinates, midpoint, parallel See command words			
		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 9 – Shared area. Pearson's progress second edition support/core/extend textbook Ch9: Check Up, Strengthen and Extend questions.		

		Knowledge Quiz	Knowledge Quiz and self-assessment.		Knowledge Quiz – Shared area.		
	Topic 10: transformations (Approximately 2 weeks)						
G5 G7 G8	How are shapes transformed? KS2	10.a Congruency and enlargements 10.b Symmetry 10.c Reflection 10.d Rotation 10.e Translations and combined transformations	Identify congruent shapes. Enlarge shapes using given scale factors. Work out the scale factor given an object and image. Use the language of enlargement. Understand how ratio and enlargement relate to each other (including lengths, perimeter and area). Know in enlargements, angles remain unchanged. Recognise line & rotational symmetry in 2D shapes. Solve problems using line symmetry. Understand the symmetries of 3D solids and the shapes of their planes of symmetry. Understand the relationship between rotational and line symmetry in regular polygons. Recognise and carry out reflections in a mirror line. Reflect a shape on a coordinate grid. Find the line for a reflection on a coordinate grid. Describe a reflection on a coordinate grid. Draw and describe rotations with a given centre. Describe and carry out rotations on a coordinate grid. Translate 2D shapes. Transform 2D shapes by combining translations. Transform 2D shapes by combining transformations. Know that in translation, rotation, reflection the image is congruent to the object. Understand that combined transformations can be equivalent to a single transformation.	Transformation, mirror line, reflection, congruent, transformation, translation, rotation, centre of rotation, clockwise, anticlockwise, enlargement, scale factor, object, image See command words	Pupils are expected to complete purposeful exercises and repeated practice on: • Identify congruent shapes • Identifying symmetry • Enlargements • Reflections • Rotations • Translations Ensure written work is of a high quality and encourage students to SHAPE answers when explaining with reasoning. Plenary style questions – White Rose Maths - Assessment Papers Maths Box > Topic resources > 4 Questions / Exit tickets	• Support/core/extend KS3 book year 7 Ch10 • Pearson's Pi1 Ch10 • Pearson's Theta1 Ch10 • Pearson's Delta2 Ch5 • Cambridge Essentials 7 support/core/extension GMCh2-4, ACh1 Key & exemplar questions – WRM - Position-&-Direction WRM -Rotation-and-translation WRM - Enlargement-and-Similarity Year 7 Term 6 Knowledge Organiser for key terms, recall and low stakes quizzing. Tracing Paper Pre-prepared printed worksheets for practice. Please see the Resources section for available materials on practice questions	**SMSC and BV** Demonstrate the use of patterns and symmetry in symbolism in other faiths and cultures. Use examples such as Rangoli patterns, Fibonacci sequences, tessellations and Islamic geometric patterns.
		Knowledge Recall	Big questions of the unit are reviewed, and key areas revisited. Planned consolidation.		Knowledge Recall Lesson – Unit 10 – Shared area.		

			Worded problems should be used, as well as addressing any consistent errors, encourage and explore topic links and supported multistep problems.	Pearson's progress second edition support/core/extend textbook Ch2: Check Up, Strengthen and Extend questions.	
		Knowledge Quiz	Knowledge Quiz and self-assessment.	Knowledge Quiz – Shared area.	
Assessments for the year group will take place in Week 3 of each term, followed by feedback and focussed Pupil Improvement Time					

Use of Big Questions and Lesson Questions

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

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

Common Misconceptions Notes

Unit 1

Misreading pictogram keys, misinterpreting instructions such as 'more than 2', giving the frequency of the most common item rather than the most common item.
Misreading scales or assuming each square on the grid represents 1. Give plenty of practice in reading different scales.
Forgetting to label axes and include a title on graphs. Pictorial Display several incomplete graphs and ask What is missing?
Confusing the mode, median and mean. Mode is most, median is middle, mean is the most difficult to work out so is the meanest.
Forgetting to order data before finding the median.
Confusing the mode, median and mean. Mode is most, median is middle, mean is the most difficult to work out so is the meanest.
Not fully understanding the difference between primary and secondary data.
Not recognising a leading question.
Interpret and draw dual bar charts. Students misread a scale. Ask What does one square on the frequency axis represent?
Values of a discrete class. Students may overlap discrete classes, e.g. 5–10, 10–15. Write out the values in each class and ask In which class does 10 lie? How can you avoid this problem?

Unit 2

Mis-aligning columns, place value errors
Not being familiar with times tables.
Inability to order negative numbers by not understanding that –6 is a smaller number than –5.
Not counting 0 as a number on the number line.
Multiplying by 0: common confusion between × and +, so 3 × 0 = 3. Concrete Display three plastic sandwich bags with one counter in each (3 × 1 = 3). Display three empty sandwich bags, how many counters?
Reading column calculations from left to right. Use expanded forms of the written method to build on students' understanding
Failure to understand the process of division. Explain that division is sharing or grouping, and is the inverse of multiplication
Assuming absolute value when comparing or ordering negative numbers. For example, assuming that −4 is a 'bigger' number than −2. Address this by using number lines and negative numbers in context to show that a number's value is related to its position on the number line.
Not finding all of the factors of a number. Represent as a × b, etc. and encourage a systematic approach.
When calculating –3 + 2 students may think that the first – has an effect on the second sign. Use the number line to demonstrate otherwise.
Confusing e.g. 23 with 2 × 3. Show that 2 × 3 is three 2s added together (2 + 2 + 2) whereas 23 is three 2s multiplied together (2 × 2 × 2); demonstrate 23 by building a cube from 8 smaller cubes.

Unit 3

Students may write 5x – 4x = 1x
Although it is not incorrect, explain to students that it is not necessary to write the 1. Convention is to write 5x – 4x = x

Students may write 3y – y = 3
Concrete Resolve by using yellow counters or rods. Show that 3 yellow counters take away 1 yellow counter = 2 yellow counters.
When substituting into a formula such as h = 5t when t = 2 simply writing h = 52.
Resolve by suggesting that students always write the formula first with any missing multiplication signs put back in, so in this case, start by writing h = 5 × t, then h = 5 × 2 = 10.
Students may write 5x – 4x = 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.
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.
When expanding brackets, multiplying only the first term by the number outside the bracket e.g. 4(x + 2) = 4x + 2. Resolve using a concrete activity such as using a box to represent a bracket. Write the number outside the bracket on a sticky note e.g. × 4 and stick it on the box. Then write x and +2 on different pieces of paper and put them in the box. Tell students that when the pieces of paper are taken out of the box, both terms must be multiplied by 4.
Substituting incorrectly into a formula. For example, v = at when a = 5 and t = 6, simply writing v = 56. Resolve by suggesting that students always write the formula first with any missing multiplication signs put back in, so in this case, start by writing v = a × t, then v = 5 × 6 = 30.
Confusion between 3 + a and 3a.
Assuming $x^2 = 2x$.
Incorrectly simplifying 9y – 7y to –2y.
Failing to follow the priority of operations when substituting into formula.

Unit 4
Not having a grasp of the approximate size of units of length. Pictorial Make a poster of familiar items/distances that are approximately 1 mm and 5 mm, 1 cm and 10 cm, 1 m and 10 m and 1 km and 10 km. Concrete Categorise by measuring items around the school that are approximately 1 m, much shorter than 1 m, much longer than 1 m; categorise smaller items into < 15 cm (length of a short ruler) approx 15 cm, longer than 15 cm.
Thinking that, when ordering decimals, 1-place decimals are always smaller than decimals with 2 places. Pictorial Use empty mini-hundred grids to colour tenths and hundredths to show, for example, that 0.4 is more than 0.35.
Alternatively make all the decimals the same length by writing a 0 in the hundredths place: 0.40, making the link with whole numbers: 40 > 35, so 0.4 > 0.35 Concrete Make the link with coins – there are 100 pennies in a pound, so each 1p is 1/100 of a pound and each 10p is a tenth of a pound. £1.40 is more than £1.35.
Making errors in column subtraction of decimals when the digit being subtracted is larger than the number it is being subtracted from. Concrete Use base-10 equipment with the 100 squares representing the whole number, the tens the tenths and the units the hundredths, so that they can be physically exchanged. Use an alternative method, such as counting up on number lines.
Not measuring from 0 on a ruler. This should be correctly modelled by the teacher at every opportunity.
Ordering errors when comparing different numbers of decimal places i.e. 3.16 > 3.6. Encourage students to write numbers with equal numbers of decimal places, using zero placeholders where necessary.
Using the wrong operation (×10 instead of ÷10) when converting between units. Ensure, for example, that students understand that, as mm are smaller than cm; it takes more of them to make the same length, therefore to change from cm to mm multiply by 10.
Failure to line up decimal points when adding or subtracting. Ensure that this is relentlessly modelled in any calculation. Utilise squared paper.
Confusing ascending and descending. Emphasise that descending means the numbers are decreasing or going down.
Placing negative numbers in the wrong order. Concrete Use a thermometer/temperature scale and ask students whether –2°C is less than (colder) than –1°C.
Multiplication always makes a number bigger.
Difficulty remembering the meanings of scalene, isosceles and equilateral. Give plenty of practice in identifying the different types of triangles.
Not recognising line symmetry if the line of symmetry is not vertical. Encourage students to turn their page and give practice in recognising line symmetry of shapes in different orientations.
Forgetting the names of polygons. Give plenty of practice in naming polygons. Discuss strategies for remembering them; for example, using other words with the same prefix (e.g. octopus).
Forgetting to multiply by 10^3 to convert between cm^3 and mm^3 – only multiply by 10.

Unit 5
Assuming the larger the denominator of a fraction, the larger the fraction. Pictorial show and using bars or pizzas cut into slices and discuss which is larger.
Confusing 5% and 50% or similar. Show students 5% and 50% on the board and discuss how we write them as fractions and decimals. Ask students how we might write 3% and 30% as fractions and decimals.
Confusion between pounds and pence. Before starting the lesson ask pupils to convert amounts in pence into pounds, and vice versa.
When comparing unit fractions, assuming that the fraction with the bigger denominator is the bigger fraction. Concrete Resolve by using fraction strips or rods to show which fraction is bigger.
Not using the total as the denominator when writing one number as a fraction of another. For example, 3 boys and 7 girls, are boys, not .
Resolve by telling students to write the fraction as they would say them, i.e. 3 out of a total of 10 children were boys and 7 out of a total of 10 children were girls.
To find 10% you divide by 10, so to find 20% you divide by 20. Resolve by demonstrating using a concrete activity. For example, start with 30 counters. What is 10% of 30? 3. Arrange the counters into 10 piles of 3 counters. Demonstrate that 20% of the counters is 2 of the piles (i.e. 6 counters), 30% is 3 of the piles, etc.
Not simplifying fully when writing a fraction in its simplest form. Resolve by suggesting students do a final check each time to see if both the numerator and denominator can be divided by 2, 3, or 5.
Not making the fractions have equal denominators before calculating.

Unit 6
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.
Inability to round up or down – use a number line to model physical proximity.
Ordering decimal misconceptions – i.e. thinking 3.4 is smaller than 3.13 because 4 is smaller than 13. Use zero placeholders and compare equal number of decimals after the decimal point.
Confusing ascending and descending.
Confusion with ordering negative numbers. Re-iterate that the more negative a number is the smaller it is. Use number line to demonstrate if required.
Students often confuse < and >. Open end points to larger number.
Not lining up decimal points when adding or subtracting.
Failing to grasp how to use multiplying by powers of ten to remove decimal points in decimal ratios.
Failure to understand unit ratios as being a special decimal ratio where one quantity is 1.
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 7
Not finding the value of one item first when answering a question that requires the use of the unitary method. Resolve by emphasising the importance of breaking the question down to one item first, before building up.
Writing a ratio in the wrong order. Resolve using a concrete activity showing that a ratio of 1 : 4 is not the same as 4 : 1 using coloured counters/beads.
Not writing a ratio in its simplest form. Resolve by suggesting that students check to see if both numbers are divisible by 2, 3, 5 or 7 (and possibly more prime numbers if necessary).
When changing a ratio to a percentage, not writing the total as the denominator of the starting fraction. Concrete Use coloured counters to represent the objects involved.

Chapter 8
Students maybe unsure whether to multiply or divide when converting between units.
Students may not be familiar with some of the metric or imperial units and it would be useful for them to see practical examples of where both units are being used so that they get an idea of the relative size.
Students can sometimes have misconceptions about the multiplicative relationship between quantities in direct proportion and look at what is added or subtracted rather than multiplied or divided.

Unit 8
Reading the wrong scale on a protractor when measuring angles. Practice using a protractor before the start of the lesson. Discuss which scale you should read for different angles.
Confusing angles on a straight line/round a point. Concrete Before the start of the lesson ask students to rotate through 360°/180°.
Not seeing angle as a measure of turn. Demonstrate how an angle size depends on the turn using electronic or other materials.
Failure to measure angles correctly with a protractor. Demonstrate using large scale or electronic equipment, emphasising the two scales.
Assuming all triangles have 3 lines of symmetry. Use counterexamples of triangles with obtuse angles (non-isosceles).
Not subtracting correctly from 180. Give further mental arithmetic practice, or encourage students to use written methods if required.
Inability to calculate accurately. Give plenty of mental practice.
Misnaming shapes. Give frequent practice and quizzes, especially for quadrilaterals.
Students are careless when identifying opposite angles. Encourage students to use a ruler to identify vertically opposite angles.
Students assume features of a shape, e.g. parallel lines, equal angles/sides, angle bisectors. Emphasise that they must not make any assumptions about abstract diagrams.

Unit 9
Misreading axis scales. Advise students to read the graph's title and axis labels, then look carefully at the axes and work out what each square represents before answering the question; encourage them to use a ruler to read off values or follow the grid lines with their finger.
Confusing x- and y-coordinates (especially when one or the other is 0). Resolve by giving students lots of practice before the lesson, so they become fluent.
Confusing positive and negative coordinates. Resolve by encouraging students to relate the coordinate grid to a number line.
Confusing x- and y-coordinates (especially when one or the other is 0). Resolve by giving students lots of practice before the lesson, so they become fluent.
Confusing positive and negative coordinates. Resolve by encouraging students to relate the coordinate grid to a number line.
Applying inverse functions in the wrong order, e.g. for $2x + 3 = 7$, dividing by 2 first. Encourage students to draw function machines or balance diagrams to see why they need to subtract the 3 first. They can also explain the equation in words, in terms of 'what has happened to x (multiplied by 2, then add 3) and reverse it. The analogy of putting on socks then shoes, then reversing the order to 'undo' this (take of shoes then socks) may be helpful.

Subtracting the x term on the LHS from both sides automatically, without seeing which x term has the larger coefficient, and then having to work with negative values (increasing the likelihood of calculation error). The investigation addresses this.

Unit 10

Failing to 'flip' the shape when it is reflected. Concrete Give students mirrors and discuss which hand/side of the face responds when they wave/wink. Explain that a mirror flips the image. If students struggle to visualise the resulting image, turn page over and look at shape through page.

Giving the instructions for a translation in the incorrect order. Visual Show an aeroplane taking off – it must travel along a runway before it takes off, therefore you must give the instructions for sideways movement before up / down.

Assuming shapes are only congruent if their orientation is the same. Concrete Encourage use of tracing paper to identify congruent shapes.

Confusion between equations of line of the form x = a and y = a.

Rotating shapes in the wrong direction.

When enlarging a shape, by for example scale factor 2, failing to count the original 'journey' in the enlargement.

Incorrectly reading the vectors and moving vertically before horizontally.

Assuming the order in which transformations are carried out is commutative.

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