

Secondary Scheme of Learning

Five Year Overview

#MathsEveryoneCan

White
Rose
Maths

Welcome to Our New Schemes

Welcome to the new five-year scheme of learning for secondary mathematics. We have listened to what teachers have said about our previous Key Stage 3 scheme, and these overviews have been developed by practising secondary practitioners within the White Rose Maths team in conjunction with other colleagues in schools.

Termly Overviews

There is a termly plan for each year group from Year 7 to Year 11. Each term is split into two half terms of six weeks, each with a common theme. Every half term is further split into blocks that ensure students spend enough time to get a deep understanding of the topic being covered.

Our new scheme has been designed with **interleaving** (revisiting topics within new contexts) as a key element. For example, Year 7 starts with developing algebraic thinking and further development of algebraic skills is then woven throughout the year so students reinforce and extend their knowledge and understanding.

Calculators Skills

We firmly believe that students who are successful with number are much more confident mathematicians, so we have continued to emphasise number work throughout. We also recognise, however, that arithmetic can be a barrier to some students accessing other areas of the curriculum, so we have also incorporated the teaching and learning of calculator skills – alongside estimation – throughout the curriculum.

In our opening algebra unit, the exemplar materials in our supporting “small steps” documents are designed with calculators in mind. As well as developing their calculator skills, this is to encourage students to understand the processes of solving equations using inverse operations rather than “spotting” answers.

Recognising Prior Attainment

We also recognise that students enter secondary school with a very wide range of prior attainment. Our scheme is designed so that any student following the main content will have covered all of the GCSE Foundation tier by the end of Year 11 and therefore will have access to a grade 5. Students who have also covered additional Higher content will have access to a Grade 9. We leave it to the professional judgement of our fellow teachers to decide for each class in each unit which aspects of the Higher content to cover. Further support for this planning is provided in our “small steps” guidance documents.

We hope you find the scheme and its supporting materials useful. We look forward to your feedback.

The White Rose Maths Secondary Team

Frequently Asked Questions

Will you be providing assessments to sit alongside the schemes?

Alongside the schemes of learning, our aim is also to provide an assessment for each term in Key Stage 3. We anticipate that there will be two versions of each assessment to cater for students of different levels of attainment.

How does the scheme cater for students starting with different prior attainment?

The scheme is formed of two closely related overlapping strands, carefully designed both to maximise progression and allow flexibility. These are:

The Foundation Strand – by the end of Year 11, the Foundation strand will cover all of the content in the Foundation GCSE, allowing students to attain a grade 5

The Higher Strand – all of the Higher level GCSE content is covered, allowing access for students all the way to Grade 9

Some content will inevitably be met in the Higher strand earlier than in the Foundation strand. For those students not yet attaining as highly as their peers, there will be more time for consolidating and revisiting concepts before rushing on to new content.

We firmly believe that all students can achieve in mathematics. The scheme may be challenging for some, however we feel that the vast majority should be aiming for this standard. In extreme cases where students have considerable learning difficulties, individual schools may want to put some alternatives in place.

Can a student move between strands?

Absolutely – we don't want to put a limit on any student or any class. We expect that many students working on Foundation in some areas may well access and Higher objectives in others and encourage teachers to be flexible in choosing how and what they cover with each class. In the longer term, we hope to create intervention packages to help students who may have been following one strand for a long time to move onto another.

Many of our Year 7 students enter with scaled scores just over 100. Which strand should we start them on?

We will not be making recommendations as to who should follow each strand. We believe that almost all students will be able to access the vast majority of the first few units of work and from that, teachers will respond to their students' needs to decide how far to take each new topic.

More Frequently Asked Questions

When will the full detailed scheme be available?

As of November 2019, all of Year 7 has been released together with the Autumn term and the start of the Spring term of both Year 8 and Year 10. The remainder of Years 8 and 10 will continue to roll out during 2019/20 (roughly half a term ahead of the teaching schedule) with Years 9 and 11 following in 2020/21

What is a “small step”?

Our “small steps” are designed to provide some brief guidance to help teachers understand the key points leading towards National Curriculum objectives. This has been written by teachers for teachers and includes key vocabulary, key questions and exemplar questions that integrate reasoning and problem solving throughout.

How much does it cost?

The schemes, assessments and small steps guidance are entirely free of charge.

What supporting resources will be available?

We will provide interactive whiteboard files, powerpoints where all the exemplar questions can be edited, extra guidance for lower attainers and an exemplar lesson free of charge. We also offer training and resource packages for those schools wanting additional material and support. These will be available at a reasonable price to ensure they are accessible to all that want or need them.

Could we start the Key Stage 4 version with our new Year 10 in September?

The Y10 & Y11 schemes cover the whole of the Key Stage 4 content, with Key Stage 3 content as assumed knowledge. However, much of the Key Stage 3 content will be revisited as the basis for new material, especially so in the Foundation strand – so yes this is possible.

Are these schemes of learning fixed, or will they change?

We believe that schemes of learning should be living, responsive documents and we expect that as this goes through its first live run-through there will be a need to make tweaks here and there as we continue to learn and improve – indeed we already have. We are all practising teachers and will use our findings and feedback to keep developing the scheme. That being said, we expect any future changes to be minor.

I have more questions! Who do I contact with these?

Please do pass your queries on to us via support@whiterosemaths.com and although we can't promise to reply to everyone individually we will produce regular blogs responding as soon as is practical in response to your questions. Follow us [@WRMathsSec](https://twitter.com/WRMathsSec) on Twitter and sign up to our newsletter for ongoing updates and details.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Algebraic Thinking						Place Value and Proportion					
	Sequences		Understand and use algebraic notation		Equality and equivalence		Place value and ordering integers and decimals			Fraction, decimal and percentage equivalence		
Spring	Applications of Number						Directed Number		Fractional Thinking			
	Solving problems with addition & subtraction		Solving problems with multiplication and division			Fractions & percentages of amounts	Four operations with directed number			Addition and subtraction of fractions		
Summer	Lines and Angles						Reasoning with Number					
	Constructing, measuring and using geometric notation			Developing geometric reasoning			Developing number sense		Sets and probability		Prime numbers and proof	

Autumn Half Term 1 – Algebraic Thinking		
Block 1 – Weeks 1 and 2	Block 2 – Weeks 3 and 4	Block 3– Weeks 5 and 6
Exploring sequences <ul style="list-style-type: none"> Describe and continue sequences in diagram and number forms, both linear and non-linear Compare numerical and graphical forms 	Understanding and using algebraic notation <ul style="list-style-type: none"> Use single function machines and series of two function machines with numbers, bar models and letters Use and interpret algebraic notation Understand and use inverse operations Form and substitute into expressions, including to generate sequences. Represent functions graphically 	Equality and equivalence <ul style="list-style-type: none"> Understand equality Use fact families Form and solve one-step equations Understand equivalence of algebraic expressions Collect like terms
Notes/Links/Interleaving <ul style="list-style-type: none"> Calculators should be used throughout this unit, building in teaching efficient use of calculators and informal estimation All material in this unit is revisited and extended in forthcoming units 		Additional Higher Content <p>This introductory unit is designed to be accessed by all students – exemplification documents will illustrate tasks suitable for students of different levels of prior attainment including challenge for higher attainers.</p>

Autumn Half Term 2 – Place Value and Proportion	
Block 4 – Weeks 7 to 9	Block 5 – Weeks 10 to 12
Place value and ordering <ul style="list-style-type: none"> Recognise and use integer place value up to one billion Recognise and use decimal place value to at least hundredths Work out intervals and use number lines Compare and order numbers Use ordered lists to find the range and the median of a set of numbers Round numbers to positive powers of ten Round numbers to one significant figure 	Fraction, decimal and percentage equivalence <ul style="list-style-type: none"> Represent tenths and hundredths on diagrams and number lines Interchange between fractions, decimals and percentages for multiples of one tenths and one quarter Interpret pie charts Equivalent fractions Convert between other fractions, decimals and percentages
Notes/Links/Interleaving <ul style="list-style-type: none"> Solve equations with fractions, including fractional coefficients Consider sequences with fractions 	Additional Higher Content <ul style="list-style-type: none"> Explore and use standard index form Explore fractions above one Convert multiples of one eighth to decimals and percentages

Spring Half Term 1 – Application of Number		
Block 1 – Weeks 1 and 2	Block 2 – Weeks 3 to 5	Block 3 – Week 6
Addition and Subtraction <ul style="list-style-type: none"> Use mental and formal written methods of addition with integers and decimals, including choosing the most appropriate method Solve problems in the context of perimeter, money and frequency trees and tables Solve problems in the context of bar charts and line charts 	Multiplication and division <ul style="list-style-type: none"> Multiply by 10, 100 and 1000, 0.1 and 0.01, and convert metric units Use mental and formal written methods of multiplication and division Find the HCF and LCM of small numbers Evaluate areas of triangles, rectangles and parallelograms Find the mean of a set of numbers Find simple fractions and percentages of amounts Begin to use the order of operations 	Fractions and percentages of amounts <ul style="list-style-type: none"> Work out simple fractions and percentages of amounts, with and without a calculator
Notes/Links/Interleaving <ul style="list-style-type: none"> Perimeter problems to revisit equations and simplifying Tables to include distance charts and simple timetables Revisit rounding Choosing when to use mental, written or calculator methods Order of operations to be revisited with negative numbers 		Additional Higher Content <ul style="list-style-type: none"> Explore addition of numbers given in standard form Evaluate the area of a trapezium Find the HCF and LCM of algebraic expressions Find areas involving algebraic expressions Use fractions greater than 1

Spring Half Term 2 – Directed Number and Fractional Thinking	
Block 4 – Weeks 7 to 9	Block 5 – Weeks 10 to 12
Directed Number <ul style="list-style-type: none"> Order directed numbers, both in contextualised and abstract situations Revisit four operations to include directed number Use a calculator with directed number Solve two-step equations (with and without a calculator) Use the order of operations 	Adding and subtracting fractions <ul style="list-style-type: none"> Represent tenths and hundredths on diagrams and number lines Convert mixed numbers and improper fractions Add and subtracting fractions with <ul style="list-style-type: none"> the same denominator one denominator a multiple of the other different denominators Add and subtract fractions and decimals e.g. $\frac{3}{4} + 0.2$
Notes/Links/Interleaving <ul style="list-style-type: none"> Include inequality number lines Revisit sequences, substitution and equations 	Additional Higher Content <ul style="list-style-type: none"> Negative square roots Higher powers

Summer Half Term 1 – Lines and angles	
Block 1 – Weeks 1 to 3	Block 2 – Weeks 4 to 6
Construction and measuring <ul style="list-style-type: none"> Understand and use letting and labelling notation for lines and angles Draw and measure lines and angles accurately Classify angles Identify and draw parallel and perpendicular lines Recognise types of triangle, quadrilateral and other polygons Construct triangles given SSS, SAS, ASA Draw and interpret pie charts 	Geometric Reasoning <ul style="list-style-type: none"> Calculate and use angles at a point, angles on a straight line and vertically opposite angles Calculate missing angles in triangles and quadrilaterals
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit simplifying and perimeter in e.g. polygons Form and solve equations in geometric settings Revisit mental and formal methods of addition and subtraction, including with decimals 	Additional Higher Content <ul style="list-style-type: none"> Understand and use parallel lines rules Understand and use the sum of angles in any polygon Derive simple proofs using angles rules

Summer Half Term 2 – Reasoning with number		
Block 3 – Weeks 7 and 8	Block 4 – Weeks 9 and 10	Block 5 – Weeks 11 and 12
Developing Number Sense <ul style="list-style-type: none"> Mental arithmetic strategies Use known facts to derive other facts, Evaluate an algebraic expression given a related fact Use estimation 	Sets and Probability <ul style="list-style-type: none"> Understand and use set notation Draw and interpret Venn diagrams Understand and use the language of probability Calculate the probability of a single event Use the sum of probabilities of an event is 1 	Prime numbers and proof <ul style="list-style-type: none"> Recognise prime, square and triangle numbers Express a number as a product of prime factors Powers and roots Make and test conjectures Understand and use counterexamples
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit FDP equivalence, and simple FDP addition and subtraction Revisit factors and multiples, both numerically and algebraically 	Additional Higher Content <ul style="list-style-type: none"> Understand and use the complement of a set Use prime factors to find HCFs and LCMs 	

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Proportional Reasoning						Representations					
	Ratio and scale	Multiplicative change		Multiplying and dividing fractions		Working in the Cartesian plane			Representing data		Tables & Probability	
Spring	Algebraic techniques						Developing Number					
	Brackets, equations and inequalities				Sequences	Indices	Fractions and percentages		Standard index form		Number sense	
Summer	Developing Geometry						Reasoning with Data					
	Angles in parallel lines and polygons	Area of trapezia and circles		Line symmetry and reflection		The data handling cycle				Measures of location		

Autumn Half Term 1 – Proportional Reasoning		
Block 1 – Weeks 1 and 2	Block 2 – Weeks 3 and 4	Block 3– Weeks 5 and 6
Ratio and Scale <ul style="list-style-type: none"> Understand ratio and its link to multiplication Use ratio notation Reduce ratios to simplest form Solve ratio problems Calculate the circumference of a circle 	Multiplicative Change <ul style="list-style-type: none"> Use scale factors, linking to ratio, to solve simple direct proportion problems Convert between currencies, including using graphs Draw and interpret scale diagrams and maps 	Multiplying and dividing fractions <ul style="list-style-type: none"> Multiply and divide a fraction by an integer Multiply and divide a fraction by a fraction Understand and use the reciprocal
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit area Revisit equations Revisit converting improper fractions and mixed numbers Link to fractions of an amount 		Additional Higher Content <ul style="list-style-type: none"> Express any ratio in the form $1:n$ Explore direct proportion graphs Multiply and divide mixed numbers Multiply and divide simple algebraic fractions

Autumn Half Term 2 – Representation		
Block 4 – Weeks 7 to 9	Block 5 – Weeks 10 and 11	Block 6 – Week 12
Working in the Cartesian plane <ul style="list-style-type: none"> Plot and interpret straight line graphs Understand and use the equations of a straight line, including lines parallel to the axes Make links between direct proportion and straight lines of the form $y = kx$ Model situations by translating them into expressions, formulae and graphs 	Representing data <ul style="list-style-type: none"> Draw and interpret scatter graphs Understand correlation Draw and use lines of best fit Understand grouped and ungrouped, discrete and continuous data Design and use one and two-way tables 	Probability <ul style="list-style-type: none"> List outcomes using sample space diagrams for one and two events Find probabilities using tables and Venn diagrams
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit calculation with directed number Link to solving one and two-step linear equations Revisiting Venn diagrams and set notation Links to representing data and using graphs in other areas of the curriculum 		Additional Higher Content <ul style="list-style-type: none"> Find the mid-point of a line segment Explore gradient Explore non-linear graphs Use the product rule for counting

Spring Half Term 1 – Algebraic Techniques		
Block 1 – Weeks 1 to 4	Block 2 – Week 5	Block 3 – Week 6
Brackets, equations and inequalities <ul style="list-style-type: none"> Expand, and factorise into, single brackets Form and use expressions, formulae and identities Form and solve equations and inequalities with and without brackets Distinguish between equations, expressions, formulae and identities 	Sequences <ul style="list-style-type: none"> Generate sequences using more complex rules, e.g. with brackets and squared terms, both in words and algebraically 	Indices <ul style="list-style-type: none"> Form expressions using indices Understand and use the addition and subtraction rules
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit the use of directed number Solve equations set in the context of earlier contexts – shapes, angles, probability, ratio etc. 	Additional Higher Content <ul style="list-style-type: none"> Expand a pair of binomials Solve equations and inequalities with unknowns on both sides Find the rule for the n^{th} term of a linear sequence Explore powers of powers 	

Spring Half Term 2 – Developing number		
Block 4 – Weeks 7 and 8	Block 5 – Weeks 9 and 10	Block 6 – Weeks 11 and 12
Fractions and percentages <ul style="list-style-type: none"> Develop understanding of fractions, decimals and percentages Evaluate percentage increases and decreases Use multipliers to solve percentage problems Express one number as a percentage of another 	Standard index form <ul style="list-style-type: none"> Convert between numbers in ordinary and standard form Compare numbers given in standard form Calculate with numbers given in standard form, with and without a calculator 	Number sense <ul style="list-style-type: none"> Develop mental strategies Convert between metric measures and units Estimation, including rounding to a given number of decimal places Use the order of operations
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit fraction, decimal and percentage equivalence Revisit formal methods for calculation, for integers and fractions Compare and use ratios in the context of FDP 	Additional Higher Content <ul style="list-style-type: none"> Finding the original given any percentage Understand and use surd notation Understand and use negative and simple fractional indices Convert between units of area and volume Use error interval notation 	

Summer Half Term 1 – Developing geometry		
Block 1 – Weeks 1 and 2	Block 2 – Weeks 3 and 4	Block 3– Weeks 5 and 6
Angles in parallel lines and polygons <ul style="list-style-type: none"> Review Y7 angles rules Understand and use parallel lines and angles Revisit geometric notation Work out angles in special quadrilaterals Find and use the sum of interior and exterior angles of a polygon Prove simple geometric facts 	Area of a trapezia and circles <ul style="list-style-type: none"> Review area of shapes covered in year 7 Calculate the area of a trapezium Calculate the area of a circle, and the area of parts of a circle Use significant figures Calculate the area of compound shapes 	Line symmetry and reflection <ul style="list-style-type: none"> Recognise line symmetry in polygons and other shapes Reflect shapes in horizontal, vertical and diagonal lines
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit forming and solving equations Revisit properties of shapes Revisit equations of straight lines 		Additional Higher Content <ul style="list-style-type: none"> Perform standard constructions including perpendiculars Understand and use the properties of diagonals of quadrilaterals

Summer Half Term 2 – Reasoning with data	
Block 4 – Weeks 7 to 10	Block 5 – Weeks 11 and 12
The data handling cycle <ul style="list-style-type: none"> Understand and use primary and secondary sources of data Collect data, including using questionnaires Interpret and construct statistical diagrams, including multiple bar charts Construct and interpret pie charts Compare distributions using charts Identify misleading graphs 	Measures of location and dispersion <ul style="list-style-type: none"> Revisit the median and mean, including finding the total given the mean Find the mean of grouped data Work out the mode and modal class Choose the appropriate average Comparing distributions using measures
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit finding the range Use algebraic substitution to form lists for averages and the range Links to data collection and representation in other areas of the curriculum 	Additional Higher Content <ul style="list-style-type: none"> Find unknown data values given the mean or changes in the mean Explore histograms for unequal groups Find the median from a table of values

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Reasoning with Algebra						Constructing in 2 and 3 Dimensions					
	Straight line graphs		Forming and solving equations		Testing conjectures		Three dimensional shapes			Constructions and Congruency		
Spring	Reasoning with Number						Reasoning with Geometry					
	Numbers		Using percentages		Maths and money		Deduction		Rotation and translation		Pythagoras' Theorem	
Summer	Reasoning with Proportion						Representations					
	Enlargement and similarity		Solving ratio and proportion problems			Rates	Solving problems using graphs, tables and algebra					

Autumn Half Term 1 – Reasoning with Algebra		
Block 1 – Weeks 1 and 2	Block 2 – Weeks 3 and 4	Block 3– Weeks 5 and 6
Straight line graphs <ul style="list-style-type: none"> Interpret straight line graphs Find and use the equation of a straight line Reduce equations to the form $y = mx + c$ Compare to linear sequences and finding the rule for the n^{th} term 	Forming and solving equations and inequalities <ul style="list-style-type: none"> Revisit and extend to equations and inequalities with unknowns on both side using all previous contexts: angles, probability, area etc. Change the subject of a formula 	Testing conjectures <ul style="list-style-type: none"> Test conjectures in a wide range of context e.g. <ul style="list-style-type: none"> Sums and products of odd and even numbers Is a given number in a sequence? Is this shape...? Are these lines parallel? What would happen if...?
Notes/Links/Interleaving <ul style="list-style-type: none"> Link equations of graphs to solving equations Revisit key topics through equations Review use of brackets Review geometric properties and rules 		Additional Higher Content <ul style="list-style-type: none"> Solve a pair of simultaneous equations using graphical methods Change the subject of a complex formula Explore the gradients of perpendicular lines

Autumn Half Term 2 – Constructing in 2 and 3 Dimensions	
Block 4 – Weeks 7 to 9	Block 5 – Weeks 10 to 12
Three dimensional shapes <ul style="list-style-type: none"> Understand the language of faces, edges and vertices Know the names of common prisms and non-prisms Identify 2-D shapes within 3-D shapes Work out the volume and surface area of cuboids and cylinders Work out the volume of any prism Work out missing lengths given area and/or volume 	Constructions and congruency <ul style="list-style-type: none"> Construct 3-D shapes from nets, and construct the net of a given 3-D shape Construct and use scale drawings Construct perpendiculars and bisectors Understand congruency Exploring congruency via construction
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit estimation Revisit rounding to nearest integer, decimal places, significant figures Revisit unit conversions, including area and volume units 	Additional Higher Content <ul style="list-style-type: none"> Explore volume of cones, spheres and complex shapes Work out the surface area of any prism Explore the locus of a path

Spring Half Term 1 – Reasoning with number		
Block 1 – Weeks 1 and 2	Block 2 – Weeks 3 and 4	Block 3– Weeks 5 and 6
Numbers <ul style="list-style-type: none"> Revisit types of number – extend to include rational and real numbers Revisit fraction arithmetic Extend knowledge of HCF and LCM Revisit standard form 	Using percentages <ul style="list-style-type: none"> Revisit percentage increase and decrease Use percentages over 100% Find percentage changes Use multipliers in a variety of contexts Solve “reverse percentage” problems 	Mathematics and money <ul style="list-style-type: none"> Explore financial mathematics including: <ul style="list-style-type: none"> Bills and bank statements Interest Unit pricing (best buys)
Notes/Links/Interleaving <ul style="list-style-type: none"> Add and subtract fractions (lowest common denominator) Working out fractions of amounts FDP equivalence Ratio 		Additional Higher Content <ul style="list-style-type: none"> Work with repeated percentage change

Spring Half Term 2 – Reasoning with geometry		
Block 4 – Weeks 7 and 8	Block 5 – Weeks 9 and 10	Block 6– Weeks 11 and 12
Deduction <ul style="list-style-type: none"> Revisit angles rules, including within special quadrilaterals Find angles using algebraic methods Use chains of reasoning to evaluate angles 	Rotation and translation <ul style="list-style-type: none"> Identify the order of rotational symmetry of a shape Find the result of rotating a shapes Translate points and shapes by a given vector Understand variance and invariance in the context of transformations 	Pythagoras’ theorem <ul style="list-style-type: none"> Identify the hypotenuse of a right-angled triangle Determine whether a triangle is right-angled Calculate missing sides in right-angled triangles
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit fractions and directed number in the context of rotation Compare and contrast rotational symmetry with line symmetry Identify 2-D and 3-D shapes Link constructions and geometric reasoning 		Additional Higher Content <ul style="list-style-type: none"> Develop more complex geometrical proofs Find the result of a series of transformations Explore proofs of Pythagoras’ theorem Use Pythagoras’ theorem in 3-D shapes

Summer Half Term 1 – Reasoning with proportion

Block 1 – Weeks 1 and 2

Enlargement and similarity

- Enlarge shapes by a positive scale factor, including from a given point
- Calculate the lengths of missing sides in similar shapes

Block 2 – Weeks 3 and 4

Solving ratio and proportion problems

- Direct proportion problems and graphs
- Conversion graphs
- Solve ratio problems given the whole or a part
- Simple inverse proportion
- Unit pricing problems ('best buys')

Block 3– Weeks 5 and 6

Rates

- Work with speed, distance, time
- Solve problems involving density
- Work with compound units

Notes/Links/Interleaving

- Links to ratio notation
- Revisit circumference
- Revisit $y = mx$
- Revisit unit pricing

Additional Higher Content

- Enlarge shapes by a negative scale factor
- Similar triangles – exploring ratios in right-angled triangles
- Inverse proportion graphs
- Converting compound measures

Summer Half Term 2 – Representations

Block 4 – Weeks 7 to 12

Solving problems using graphs, tables and algebra. Include:

- Revisit data measures, charts and graphs including bivariate data; criticise misleading graphs
- Revisit alternative representations of sequences – including finding algebraic rules
- Revisit frequency trees and other representations e.g. tables
- Revisit conversion between standard form and ordinary form, and representing numbers as products of primes
- Expand a pair of binomials
- Create and interpret tables and timetables; solve problems involving speed distance and time
- Solve inequalities on number lines, including error intervals
- Represent word problems in a variety of forms (graphs, tables, expressions...)
- Interpret graphs of any form (exponential, piece-wise, reading from quadratics, speed/time)
- Compare theoretical and experimental probabilities; probability of two or more events

Notes/Links/Interleaving

- Throughout – see above

Additional Higher Content

- Tree diagrams

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Similarity						Developing Algebra					
	Congruence, similarity and enlargement			Trigonometry			Representing solutions of equations and inequalities			Simultaneous equations		
Spring	Geometry						Proportions and Proportional Change					
	Angles & bearings		Working with circles		Vectors		Ratios & fractions		Percentages and Interest		Probability	
Summer	Delving into data						Using number					
	Collecting, representing and interpreting data						Non-calculator methods		Types of number and sequences		Indices and Roots	

Autumn Half Term 1 – Similarity	
Block 1 – Weeks 1 to 3	Block 2 – Weeks 4 to 6
Congruence, similarity and enlargement. <ul style="list-style-type: none"> Understand the difference between congruence and similarity Enlarge a shape about a given point; understand and use similarity Find missing sides in similar shapes including pairs of similar triangles Understand and use the conditions for a pair of congruent triangles 	Trigonometry <ul style="list-style-type: none"> Understand trigonometric ratios Work out missing lengths and angles in right-angled triangles Know and use the exact values of key angles
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit angle rules, including angles in parallel lines Revisit equations, especially variants of $ax = b$ Revisit Pythagoras' theorem 	Additional Higher Content <ul style="list-style-type: none"> Area and volume of similar shapes Formal proof of congruency of triangles Enlarge a shape by a negative scale factor Use trigonometry in 3-D shapes Derive and use the sine and cosine rules Use the formula $\frac{1}{2}ab\sin C$ to find the area of non-right angled triangles.

Autumn Half Term 2 – Developing Algebra	
Block 3 – Weeks 7 to 9	Block 4– Weeks 10 to 12
Representing solutions of equations and inequalities <ul style="list-style-type: none"> Form and solve equations and inequalities in a variety of contexts, including with unknowns on both sides Represent solutions to inequalities on a number line Represent solutions to equations graphically 	Simultaneous equations <ul style="list-style-type: none"> Understand the meaning of solution, appreciating that some equations have multiple solutions Form and solve a pair of linear simultaneous equations graphically Form and solve a pair of linear simultaneous equations algebraically
Notes/Links/Interleaving <ul style="list-style-type: none"> Context for equations to include probability, area, angles, ratio problems etc. 	Additional Higher Content <ul style="list-style-type: none"> Use set notation for solutions Solve Inequalities in two variable, identifying regions Solve quadratic equations and inequalities (by factorisation only) Solve simultaneous equations with one linear and one quadratic

Spring Half Term 1 – Geometry		
Block 1 – Weeks 1 and 2	Block 2 – Weeks 3 and 4	Block 3 – Weeks 5 and 6
Angles and bearings <ul style="list-style-type: none"> Review KS3 angles rules Understand and use bearings 	Working with circles <ul style="list-style-type: none"> Review area and circumference Name parts of a circle and perform related calculations Find areas and volumes related to circles – cylinder, cone, sphere etc. 	Vectors <ul style="list-style-type: none"> Understand vector notation Vector arithmetic – addition, subtraction and multiplication by a scalar Vectors and translations
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit trigonometry Revisit area and volumes of other shapes, and compound shapes Estimation, rounding and significant figures 		Additional Higher Content <ul style="list-style-type: none"> Derive, use and prove first four circle theorems (Note: The rest are covered in Y11) Understand and use the equation of a circle Construct geometric proofs with vectors

Spring Half Term 2 – Proportions and proportional change		
Block 4 – Weeks 7 and 8	Block 5 – Weeks 9 and 10	Block 6 – Weeks 11 and 12
Ratio and fractions <ul style="list-style-type: none"> Use ratios, including with mixed units Fractions in ratios Fractions from ratios Combining ratios Unit pricing ('best buys') Currency conversions 	Percentages and interest <ul style="list-style-type: none"> Convert fractions, decimals and percentages Find percentages and percentage changes Find one number as a percentage of another Calculate simple and compound interest Evaluate exponential change e.g. depreciation Find original values 	Probability <ul style="list-style-type: none"> Review of single event probability – comparing theoretical and experimental Understand and work with mutually exclusive and independent events Construct and interpret tree diagrams Find probabilities from frequency trees, tables and Venn diagrams
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit formal methods of calculation (also Summer 2) Revisit fraction arithmetic 		Additional Higher Content <ul style="list-style-type: none"> Revise area and volume ratios Use iterative methods Calculate and interpret conditional probabilities

Summer Half Term 1 – Delving into data

Block 1 – Weeks 1 to 6

Collecting, representing and interpreting data

- Understand sampling, including the possible limitations
- Construct and interpret tables and line graphs for time series data
- Understand and represent with grouped data
- Understand and identify correlation
- Use lines of best fit, understanding the dangers of extrapolation
- Construct and interpret frequency polygons
- Evaluate measures of location and dispersion
- Use statistical diagrams and measures to compare distributions

Notes/Links/Interleaving

- Use equations e.g. solving problems about the mean
- Use non-calculator methods when appropriate

Additional Higher Content

- Construct and interpret cumulative frequency diagrams, box-plots and histograms
- Understand quartiles; use and interpret the inter-quartile range

Summer Half Term 2 – Using Number

Block 2 – Weeks 7 and 8

Non-calculator methods

- Use four operations with integers (positive and negative), decimals and fractions with and without context (include all areas of previous study)
- Work with exact answers e.g. area and volume
- Evaluate calculations involving percentages

Block 3 – Weeks 9 and 10

Types of number and sequences

- Use factors, multiples, primes and prime factorisation
- Recognise arithmetic and geometric sequences
- Recognise and use other sequences

Block 4 – Weeks 11 and 12

Indices and roots

- Work out powers and roots
- Use the rules of indices
- Calculate with numbers in standard index form

Notes/Links/Interleaving

- Convert FDP
- Revisit exact trigonometrical values
- Revisit area and volume formulae (without a calculator)
- Find exact answers in terms of π
- Solve problems involving financial mathematics

Additional Higher Content

- Calculate with surds
- Find the rule for the n^{th} term of a quadratic sequence
- Understand and use fractional indices
- Work with rational and irrational numbers, including recurring decimals
- Work with limits of accuracy, including upper and lower bounds

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Graphs						Algebra					
	Gradients & lines		Non-linear graphs		Using graphs		Expanding & Factorising		Changing the subject		Functions	
Spring	Reasoning						Revision and Communication					
	Multiplicative		Geometric		Algebraic		Transforming & Constructing		Listing & describing		Show that...	
Summer	Revision						Examinations					

Autumn Half Term 1 – Graphs		
Block 1 – Weeks 1 and 2	Block 2 – Weeks 3 and 4	Block 3 – Weeks 5 and 6
Gradients and lines <ul style="list-style-type: none"> Find and use equations of straight lines 	Non-linear graphs <ul style="list-style-type: none"> Plot and read from quadratic curves Understand and find roots Plot cubic and reciprocal graphs 	Using graphs <ul style="list-style-type: none"> Reflect shapes in a given line Construct and interpret speed, distance and time graphs Construct and interpret real-life graphs
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit solving equations Incorporate proportional reasoning e.g. conversions 		Additional Higher Content <ul style="list-style-type: none"> Understand and use exponential graphs Understand and use equations of perpendicular lines Find the equation of tangent to a curve Estimate the area under a curve

Autumn Half Term 2 – Algebra		
Block 4 – Weeks 7 and 8	Block 5 – Weeks 9 and 10	Block 6 – Weeks 11 and 12
Expanding and factorising <ul style="list-style-type: none"> Expand a single bracket and binomials Factorise into a single bracket Factorise quadratics of the form $x^2 + bx + c$ Solve quadratic equations Simplify complex algebraic expressions including algebraic fractions 	Changing the subject <ul style="list-style-type: none"> Review solving linear equations Change the subject of a formula, including perimeter, area and volume formulae Volume of a pyramid 	Functions <ul style="list-style-type: none"> Find inputs and outputs Show algebraic expressions re equivalent Solve problems using the kinematics formulae
Notes/Links/Interleaving <ul style="list-style-type: none"> Revisit directed number arithmetic Link to graphs 		Additional Higher Content <ul style="list-style-type: none"> Solve quadratic equations by completing the square and using the quadratic formula Changing the subject of a formula where the subject appears more than once Work with composite and inverse functions

Spring Half Term 1 – Reasoning		
Block 1 – Weeks 1 and 2	Block 2 – Weeks 3 and 4	Block 3– Weeks 5 and 6
Multiplicative reasoning <ul style="list-style-type: none"> Review scale and enlargement Work with direct and inverse proportion Calculate with pressure and density Determine whether a problem requires additive or multiplicative reasoning 	Geometric reasoning <ul style="list-style-type: none"> Review angle facts, focusing on the language of reasons and chains of reasoning Review Pythagoras' theorem and using trigonometrical ratios 	Algebraic reasoning <ul style="list-style-type: none"> Work with complex indices Review simplification of complex expressions and finding the n^{th} term rule Justify e.g. why a number is/isn't in a given sequence
Notes/Links/Interleaving <ul style="list-style-type: none"> Revise non-calculator methods Revisit other topics as detailed above 		Additional Higher Content <ul style="list-style-type: none"> Solve problems involving variation with powers Construct formal geometric proofs, including the remaining circle theorems Construct formal algebraic proofs

Spring Half Term 2 – Revision and Communication		
Block 4 – Weeks 7 and 8	Block 5 – Weeks 9 and 10	Block 6 – Weeks 11 and 12
Transforming and constructing <ul style="list-style-type: none"> Revisit transformations of shapes, linking to types of symmetry Perform standard constructions using ruler and protractor or ruler and compasses Solve loci problems 	Listing and describing <ul style="list-style-type: none"> Work with organised lists Sample spaces and probability Complete and use Venn diagrams Work with plans and elevations Use data to compare distributions 	Show that... <ul style="list-style-type: none"> Illustrate equivalence, numerically and algebraically Justify answers Use the language of angles rules Use the conditions for congruent triangles
Notes/Links/Interleaving <ul style="list-style-type: none"> Throughout 		Additional Higher Content <ul style="list-style-type: none"> Product rule for counting Understand and use trigonometrical graphs Sketch translations and reflections of the graph of a given function Formal proof with congruent triangles

Summer Half Term 1 – Revision

Block 1 – Weeks 1 to 6

During this last half-term in the run up to the final examinations, we expect teachers to work with students on past papers and topics that have been identified that need further attention. We will provide some support material to help with key topics including:

- Number work, including multi-step problem solving
- Forming and solving equations and inequalities
- Working with formulae that students are expected to know e.g. area and volume formulae
- Probability

etc.