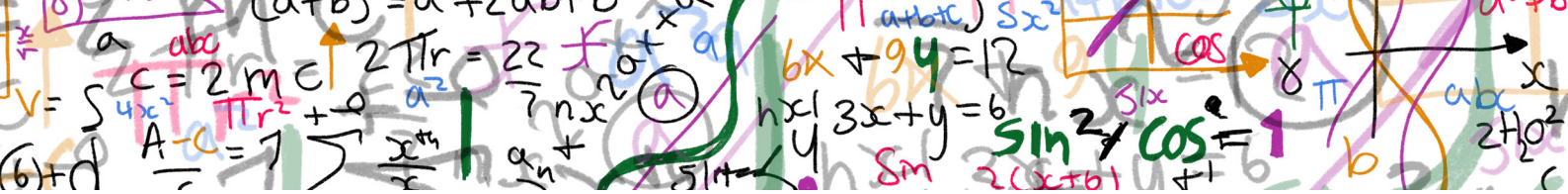


The Halifax Academy

Maths

"It's not that I'm so smart, it's just that I stay with problems longer."

Albert Einstein

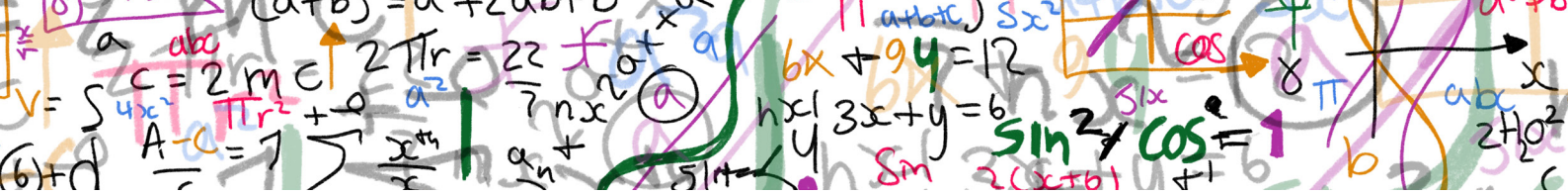
Our approach to maths combines close attention to the national curriculum with a focus on meeting our own goal of producing happy, confident and world-aware students, achieved through the three pillars of **Heart, Mind, Connect.**

We follow the recommendations of the National Centre for Excellence in the Teaching of Maths, using the 'Mastery Approach' to build a solid and long-term understanding with plenty of depth and detail. This approach underpins our entire teaching programme and is particularly well suited to our pupil demographic, leaving individuals with the skills and confidence not only to master everyday numeracy but to actually think like a mathematician and solve complex problems. To keep our teaching age-appropriate and always engaging, we use a staged lesson structure right across the different year groups, progressing naturally from physical and pictorial representations through to fully abstract calculations for older pupils. Methods like bar modelling, double number lines and manipulatives form an integral part of teaching here, and together they help to keep our lessons varied, interesting and effective.

We also encourage teamwork and good communication, asking pupils to evidence their workings, write and talk about maths, and provide supporting documents when it's relevant. These are great ways for us to use maths as a way of giving learners a range of transferable skills, which will help them in their later education and working lives. Enjoyment is crucial, of course, and we work hard to provide lessons that are fun and relatable, with cultural references to characters who our pupils are widely familiar with.

The way we teach maths helps to provide pupils with wider life skills and awareness too, which help them in every area of their lives. Our 'no fear' philosophy encourages them to experiment, take risks and embrace the threat of failure as an opportunity to learn and grow. We provide a supportive space in which pupils can safely learn how to struggle and persevere, and we consciously expose them to new challenges which help to build their overall resilience. To make sure our lessons are always inclusive we focus on mathematical fluency as well as adopting a metacognitive approach. This makes learning as easy and rewarding as possible, especially for those who might otherwise have difficulties. We also choose our examples of real-world maths and mathematicians very carefully, keeping them relevant to the everyday lives of our learners by engaging with topical themes and events like Black History Month.

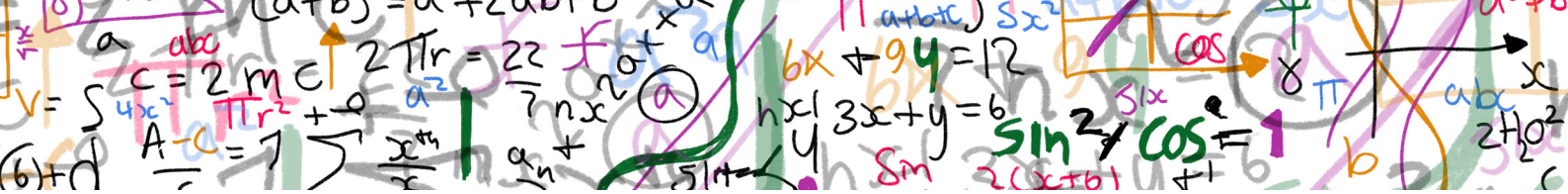
In terms of helping our pupils connect with the wider world, our lessons explore the many possible careers choices made available through maths, and we discuss everything from working in medicine and finance through to 3D design and architecture. The fact that many of our teaching staff join us from wide-ranging professional backgrounds helps with this, giving pupils an invaluable insight into the scope of opportunities maths can provide. Above all, we make sure that our love and enthusiasm for maths is passed on in the classroom, and that every individual is given the chance to develop problem-solving skills they can really be proud of, as well as learn to their full potential.



Curriculum Overview - Maths

EYFS Statutory Framework 2021 - Mathematical Development NC - Mathematics

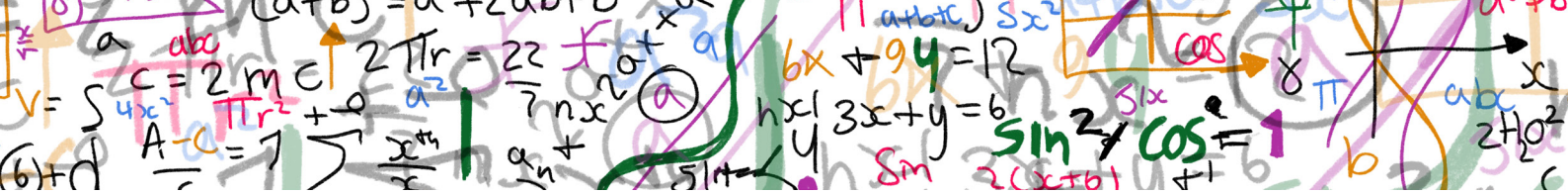
	Term 1	Term 2	Term 3
New learning	**Early Mathematical experiences** Classifying, comparing, matching and ordering Pattern and Early Number. Recognise, describe, copy and extend colourand size patterns, Count and represent the numbers 1 to 3, Estimate and check by counting **Numbers within 6** Count up to six objects, One more or one fewer, Order numbers 1 -6, Conservation of numbers within six **Addition and subtraction within 6** Explore zero, Explore addition and subtraction. Measures and time. Estimate,order compare, discuss and explore capacity, weight and lengths . Calander and time. Days of the week, seasons, Sequence daily event.	**Shape and sorting** Describe and sort 3-D shapes, Describe position accurately. **Numbers within 10** Count up to ten objects, Represent, order and explore numbers to ten, One more or fewer, one greater or less. **Addition and Subtraction within 10** Explore addition as counting on and subtraction as taking away. **Grouping and Sharing** Counting and sharing in equal groups, Grouping into fives and tens. Relationship between grouping and sharing. **Number patterns within 15** Count up to 15 objects and recognise different representations, Order and explore number patterns to 15 One more or fewer	**Doubling and Halving** solve problems, including doubling, halving and sharing, Explore the relationship between doubling and halving **Shape and Patten** Describe/sort shapes; recognise continue and create patterns **Securing Addition and Subtraction facts** Commutativity; comparing two amounts, doubling and halving **Number Patterns with 20** Count up to 10 and beyond with objects Represent, compare and explore numbers to 20, One more or fewer **Money and Measures** Compare/describe coins capacities, volumes, weights and lengths **Exploration of pattens withing number** Explore numbers and strategies, Recognise and extend patterns, Apply number, shape and measures knowledge, Count forwards and backwards



Curriculum Overview - Maths

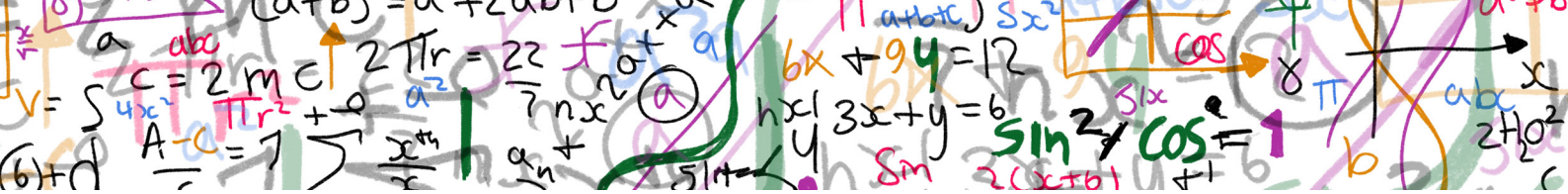
Phase 1

EYFS	Term 1	Term 2	Term 3
New Learning	**Early Mathematical experiences** Classify, match and compare objects based on one attribute. Group into sets and compare further. **Pattern, shape and early number** Describe and extend patterns. Estimate objects to 6 and check by counting. Represent and count numbers to 3. Find one more and one less. Concept of zero. Addition and subtraction within 6. **Measures** Estimate & compare, capacities, weights and lengths. Describe and sort 3D shapes. Describe position.	**Number** Count up to ten reliably and up to 15 with objects. Order up to 15. One more one less. Introduction to addition and subtraction as counting on and taking away. Sharing into equal groups, fives and tens and link to sharing. Explore the relationship between doubling and halving. **Measures** Days of the week and sequencing daily events. **Shape** Describe and sort 2-D and 3-D shapes, recognising and completing patterns.	**Number** Explore commutativity, addition & subtractions. Compare two amounts. Reliably count to 10 and explore numbers to 20. Estimate and count. Find one more and one fewer, leading to counting forwards and backwards. Further develop grouping and sharing. **Shape** Compare shapes. Recognise, continue & create patterns. **Measures** Recognise coins and values. Form combinations to 20p and change from 10p. Describe capacities. Estimate, compare and order lengths, volumes & weights.
Year 1 Manipulation and making links	**Term 1**	**Term 2**	**Term 3**
New Learning	**Number** Represent and explain addition & subtraction, using known facts and “make 10 strategies”. Investigate repeating number patterns. **Geometry** Use and follow positional lan-guage. Identify, describe and classify common 2-D & 3-D shapes.	**Number** Model, explain and choose addition and subtraction strategies. Representations and comparisons of 2-digit numbers. Understand and compare differences. Link addition and subtraction to equations. Count in 2s, 5s and 10s. Identify 1/2 and 1/4 of shapes and quantities. **Measures** Read write and tell time in full and half hour increments, linking whole and half turns to time. Compare lengths and masses using cm & kg.	**Number** Read, write compare and order numbers to 100. Find 10 more or fewer. Confident use of number bonds to 20. Sharing into equal groups, connecting halving with fractions. Explore arrays. Addition and subtraction of 2 digit with 1-digit numbers. Addition and subtraction with regrouping. **Measures** Name units and explain their value. Represent values in different ways, find change within a pound. Explore litres and fractions of capacities.
Review	• One more and one less • Doubling and halving • Commutativity • Identify, represent, compare and order numbers to 20 • Describe and sort 2-D and 3-D shapes	• Doubling and halving • Apply ‘Make Ten’ strategy • Describe and complete number patterns • Sequencing daily activities	• Doubling • Identify number patterns • Coin recognition and values • Compare lengths and capacities



Phase 2

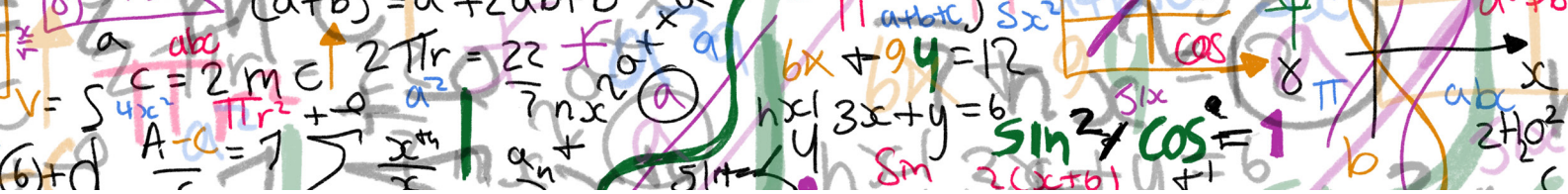
Year 2 Manipulation and making links	Term 1	Term 2	Term 3
New Learning	**Number** Addition and subtraction with two 2-digit numbers, using number bonds as appropriate. Addition of up to 3-digit numbers. Explore patterns including odds and evens, 10s and 1s. Different representations of multiplication and division. Times tables of 2, 5, 10 by skip counting and doubling **Representing data** Represent and interpret pictograms, block diagrams, tables and tally charts. **Measures** Draw, measure and compare lengths in centimetres and meters, using <, > and =	**Number** Fractions as part of a whole, relating to division. Find equivalent fractions. Addition and subtraction using regrouping, "Make 10" and "Round and Adjust" **Measures** Add and subtract £ and p accurately Tell time in halves, quarters and 5-minute increments. Calculate durations in minutes and second. **Geometry** Compare and sort 2-D and 3-D shapes, faces on 3-D shapes. Use positional language to describe direction and rotation.	**Number** Extend addition and subtraction strategies to equations. Explain and use column method for addition and subtraction. Multiplication and division facts for 3 & 4, relating 4 to doubling the 2 times table. Recognise inverse relationships. **Measures** Read scales. Read and measure temperatures. Introduce millilitres and grams and estimate & order masses and capacities, using symbols.
Review	•Read, write, represent, partition, compare and order numbers to 100 • Commutativity	• Sequence daily events • Recognise coins and notes • Calculate change	
Year 3 Building independence and autonomy	**Term 1**	**Term 2**	**Term 3**
New Learning	**Number** Find 100 more, 100 less. 3-digit place value. Round to the nearest 100, 1000. Calculate mentally and formally using a range of strategies. **Measures** Add and subtract lengths and calculate perimeter. **Data** Collect, present and interpret data in charts and tables.	**Number** Recall multiplication and division facts for 2, 3, 4, 5, 6, 8 and 10. Multiply and divide two-digit numbers by 2, 3, 4 & 5. Understand fractions as part of a whole set and as numbers. Compare, add and subtract fractions. Multiply and divide by 10 & 100. **Measures** Tell, record and order time in analogue and digital. Convert between analogue and digital. Calculate durations.	**Number** Order, compare and round numbers beyond 100. 100 more, 100 less. **Measures** Weigh and compare masses and capacities with mixed units. Read scales with different intervals. Identify angle types, parallel and perpendicular lines. Recognise quarter turns. Draw and measure 2-D shapes, including perimeter. Compare 3-D shapes.
Review	• Read, write, partition, order and compare numbers to 100, understanding place value • Find 10 more or less • Calculate mentally using known facts, round and adjust, near doubles, adding on to find the difference • Measure, draw and compare lengths	• Multiplication and division facts for 2, 3, 4 • Part-whole relationships • Commutativity and inverse relationships	• Find 10 and 100 more or less • Mental addition and subtraction strategies • Recall and use multiplication and division facts for 6- and 8-times table • Estimate mass and capacity



Curriculum Overview - Maths

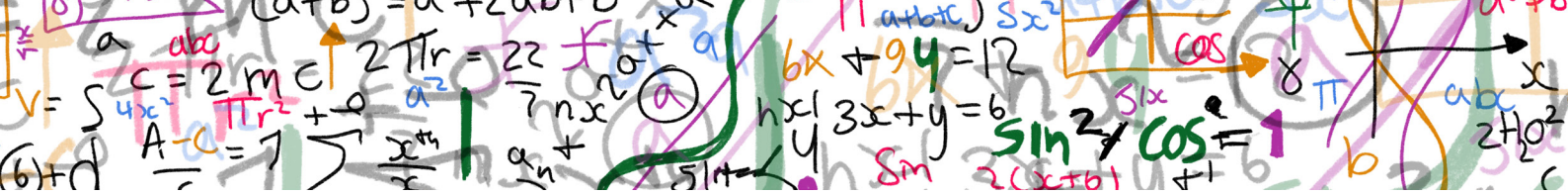
Phase 2

Year 4 Building independence and autonomy	Term 1	Term 2	Term 3
New Learning	**Number** 4-digit place value. Read, write, represent, order compare and round (to the nearest 1000). Reason to select appropriate addition and subtraction strategies, both mental and written. Use short multiplication and division. **Data** Read, interpret, construct and compare bar charts and time graphs.	**Number** Multiplication facts for 7 & 9. Equivalent fractions and improper fractions, including addition and subtraction of common denominators. Decimal place value, ordering decimals and understanding equivalence with tenths, quarters & halves. Multiply and divide decimals by 10 & 100. **Geometry** Reason with area of rectangles and other rectilinear shapes. **Measures** Convert between units of time.	**Number** Know Roman numerals up to 100 and experience place value of other number systems. Number sequences and patterns. **Geometry** Select and convert appropriate units of measurement. Describe & plot coordinates and describe translations as horizontal and vertical displacement Identify 3-D shapes from 2-D representations Identify lines of symmetry. Explore strategies to problem solve: trial and error, systematic approaches....
Review	• Find 10, 100 or 1000 more or less • Round numbers to the nearest 10, 100 • Read, interpret and construct pictograms	• Calculate perimeter • Analogue to digital, 12- hour and 24-hour • Multiply and divide by 10 and 100	• Classify, compare and order angles • Compare and classify 2-D shapes



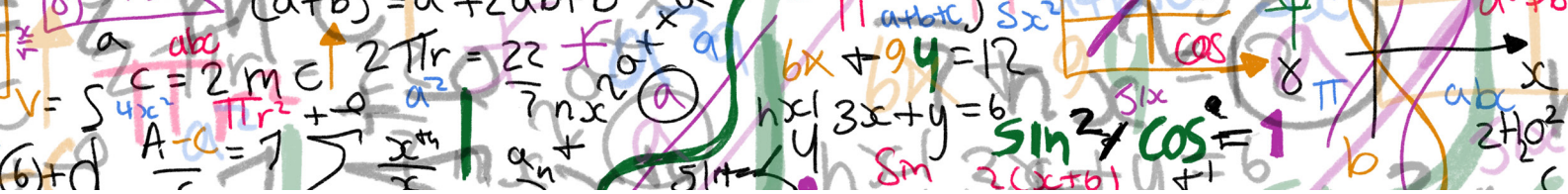
Phase 3

Year 5 Formalisation and consolidation	Term 1	Term 2	Term 3
New Learning	**Number** Read, write, order and compare numbers up to one million. Round them to the nearest power of 10. Use rounding to estimate Prioritise efficient calculation strategies. Read Roman numerals up to M Identify multiples and factors and investigate prime numbers. Illustrate and explain formal multiplication and division strategies such as short and long. **Data** Complete, read and interpret data presented in line graphs. **Shape & Measures** Read and interpret timetables including calculating intervals. Estimate area of nonrectilinear shapes.	**Number (FDP)** Read, write, order compare and round decimals to the nearest whole. Represent, identify, name, write, order and compare fractions (including improper and mixed numbers). Explore percentage, decimal, fractions equivalence. Calculate fractions of amounts. Add, subtract fractions with denominators that are multiples of the same number. Multiply fractions (and mixed numbers) by a whole number. Calculate intervals across zero. **Geometry** Coordinates in all four quadrants. Describe reflections. Measure and draw angles with a protractor. Use angle facts to calculate missing angles.	**Number** Use mental and formal strategies to add, subtract & multiply decimals. Use cube numbers and notation Interpret remainders. **Geometry** Further 2-D shape classification, reasoning about regular/irregular, properties of diagonals. **Measures** Convert between all metric units of length mass and capacity and units of time. Estimate & convert units of volume. Use approximate imperial conversions. **Data** Calculating the mean.
Review	• Multiply and divide by 10, 100 and 1000 (integers) • Read Roman numerals up to 100 • Illustrate and explain the written method of column addition and subtraction • Use a range of mental calculation strategies • Investigate area and perimeter of rectilinear shapes	• Add fractions with common denominators • Classify, compare and order angles • Describe translations • Plot coordinates in first quadrant	• Multiply and divide by 10, 100 and 1000 involving decimals • Negative numbers and calculating intervals across zero • 2-D representations of 3-D shapes. • Classify 3-D shapes



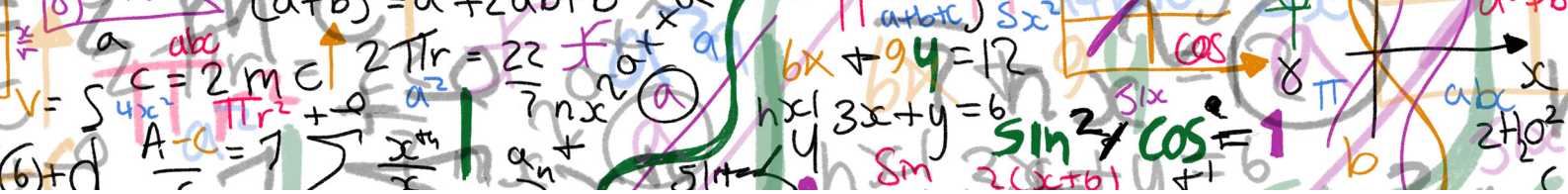
Phase 3

Year 6 Formalisation and consolidation	Term 1	Term 2	Term 3
Application & extension of keys skills	**Number** Represent, read, write, order and compare numbers up to ten million, round numbers, make estimates. Solve multi-step problems involving addition and subtraction. Multiply larger integers and decimal numbers using a range of strategies. Divide integers by 1-digit and 2-digit numbers representing remainders appropriately. Use knowledge of the order of operations to carry out calculations including the use of brackets. Generate and describe linear number sequences. Add and subtract fractions. Find decimal quotients using short division. Deepen understanding of equivalence. Order, simplify and compare fractions, including those greater than one. **Algebra** Express missing number problems algebraically, leading to solving equations with unknown values. **Geometry** Compare and classify a range of geometric shapes. Use angle facts to find unknown angles.	**Number** Multiplication involving one or two fractions. Divide fractions by integers. Link percentages to fractions and calculate and compare percentages of amounts. Understand the difference between ratio & proportion, and ratio as a scale factor. Unequal sharing in a ratio. **Geometry** Draw geometric shapes using given dimensions and angles, including naming and illustrating parts of a circle. Describe, draw, translate and reflect shapes on a co-ordinate plane. Construct 3-D shapes Calculate the area of parallelograms. Calculate, estimate and compare the volume of cuboids. **Data** Construct and interpret lines graphs and pie charts and compare pie charts.	**Exploration & Consolidation** Use of money in real life situations. Explore maths in a range of other real-life contexts.
Review	• Identify and use properties of number, focusing on primes • Illustrate and explain formal multiplication and division strategies • Recall equivalence between common fractions and decimals	• Translations and reflections • Area of a triangle • Calculate the mean • Explore the equivalence of fractions, decimals and percentages • Describe and name 2-D & 3-D shapes • Use, read, write and convert between standard units of measures; length, mass, time, money and volume as well as imperial units	



Phase 3

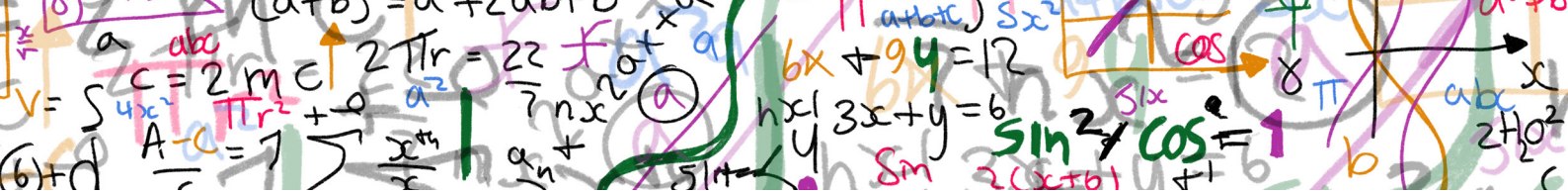
Year 7 Formalisation and consolidation	Term 1	Term 2	Term 3
New Learning	**Number** Negative numbers and operations with them. Finding common multiples. **Algebra** Algebraic expressions and collecting terms. Expansion and distributivity, leading to factorising. Forming equations & inequalities.	**Geometry** Conceptualising and comparing fractions. Manipulating and calculating with fractions, ratio and percentages. Derive angle rules around a point, on a line and at intersections and from parallel lines and transversals. Internal angles of triangles & quadrilaterals. Tessellation.	**Number** Prime factor decomposition. Constructing triangles & quadrilaterals. Finding midpoints, drawing shapes & exploring vertical & horizontal lines. Area of triangles and quadrilaterals. Combinations of translations, reflections and rotations. Enlargements.
Review	• Base 10 for integers and decimals • Multiplying and dividing by powers of ten • Four operations • Commutativity, Associativity & Distributivity • Multiplication facts • Factors, primes and squares • Common multiples • Order of operations	• Measure, describe and draw angles • Rotational & reflection symmetry • Classifying 2D shapes based on properties	• Plotting coordinates • Translations, reflections and rotations
CEAIG	Careers in cryptoanalysis (linking to forming and solving)	Careers in astronomy (linking to angles)	Careers in catering (linking to fractions and proportions)



Phase 4

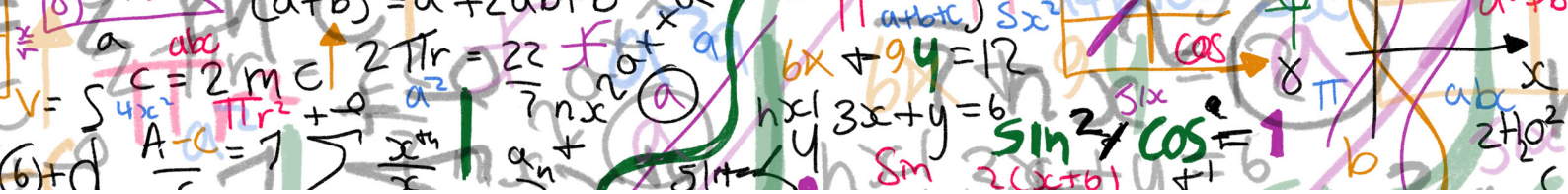
Year 8 Formalisation and consolidation	Term 1	Term 2	Term 3
New Learning	**Algebra** Position to term rules. Understand identities, expressions and equations Equate expressions in a range of contexts to form more complex equations. Forming and solving inequalities, including number line use. **Number** Rounding & estimation, including finding upper & lower bounds.	**Proportional reasoning** Sharing in a ratio. Graphing linear relationships including piecewise relationships and rates of change. Speed/ Distance/Time relationships. Direct and inverse proportion. **Geometry** Use formulae for area and circumference of circles and parts thereof. Find surface areas and volumes of prisms.	**Geometry** Angles in polygons (mostly triangles & quadrilaterals). Measure and use bearings. **Data** Data types and collection Representing data as frequency and pie charts. Measures of central tendency & spread including choosing the best measure or representation to compare data. Finding mean from tables and charts. Represent bivariate data, recognising correlation, draw.
Review	• Term to term rules of linear sequences • Inequality sign use • Rounding to the nearest whole or to the nearest power of ten	• Ratio notation and manipulation • Finding the mean	
CEAIG	Careers in animation (linking to linear sequences)	Careers in market research (linking to data collection and sampling)	Careers in design (linking to area)

Year 9 Application and extension	Term 1	Term 2	Term 3
New Learning	**Probability** Understand probability as chance. Probability of single and combined events. Use sample space diagrams and tree diagrams for combined events. Use set notation and Venn diagrams, finding Union and Intersections. **Algebra** Solve simultaneous equations algebraically with a range of methods. Solve simultaneous equations graphically. Identify regions and solve inequalities graphically.	**Geometry** Angle and exterior angle sums of any polygon. Concept of a locus. Standard constructions, angle & perpendicular bisectors. Constructing triangles and quadrilaterals. Pythagoras' theorem including on the cartesian grid and in 3D. Understand and apply the trigonometric ratios in right angled triangles.	**Algebra** Form quadratic expressions and solve quadratic equations. Rules for surds. **Number** Understand and apply rules for indices, use standard form notation. Calculate with exponential growth and decay.



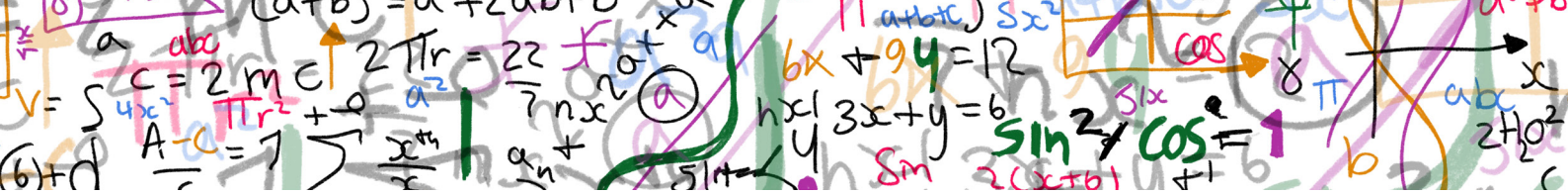
Phase 4

Year 9 Application and extension	Term 1	Term 2	Term 3
Review	• Fractions decimals & percentage conversions • Four operations with fractions • Re-arranging & solving linear equations • Drawing graphs of the form y=mx+c or ax+by=c	• Review all angle facts (around a point, on a line, at intersections and parallel lines and transversals). • Angles in triangles • Ratio, including unit ratios • Ratios and constants of proportionality	
CEIAG	Careers in medicine (linking to probability)	Careers in surveyance and cartography (linking to Pythagoras)	Careers in science (linking to exponential growth and decay)



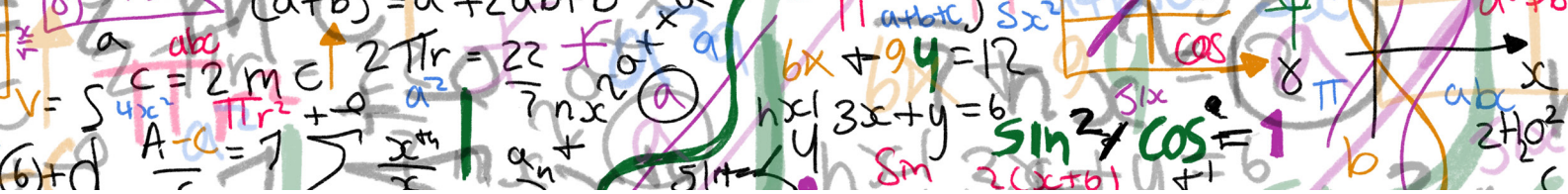
Phase 5

Year 10 Application and extension	Term 1	Term 2	Term 3
New Learning	**Number** Further powers & roots, leading to fractional and negative, operations on numbers in index form. Understand surds and how to manipulate them including rationalisation. Manipulate and calculate with standard form. Efficient use of a calculator, when appropriate. Understand the difference between rational and irrational numbers. Change recurring decimals into fractions and vice versa. **Algebra** Recognise and describe arithmetic and geometric sequences, finding nth terms. Find the nth term of a quadratic. Expand binomials and factorise quadratics including completing the square. Plot quadratic graphs and solve quadratics through a range of strategies, including graphical estimates. Simplify & Manipulate algebraic fractions. Solve simultaneous equations graphically and algebraically, including where one is a quadratic.	**Number** Manipulate and calculate with fractions, calculate proportional change including compound changes & using the language of growth and decay. Round to any degree of accuracy. Find lower and upper bounds of both discrete and continuous quantities, using appropriate inequality notation. **Probability** Find and calculate with probabilities, using addition law for mutually exclusive and multiplication for (in)dependent events as appropriate. Conditional probability. Use different representations of probability, including sample space diagrams, tree and Venn diagrams. Link relative frequency with experimental probability and make predictions. **Geometry** Undertake and combine all four transformations on the coordinate grid. Find areas and perimeters of rectilinear shapes and find circumference and areas of circles and parts thereof. Calculate surface area and volumes of 3D solids including cones, spheres and composite solids. Construct plans and elevations of solids. Convert between units of area and volume.	**Geometry** Understand similarity, finding missing sides in similar shapes and calculating the relationship between lengths, areas & volumes. Understand and use trigonometric ratios, linking them to similarity. Derive and use key exact trigonometric values. Use trigonometric relationships within non-right-angled triangles. Apply Pythagoras' theorem to problems in three dimensions, including repeated use of the theorem. Identify right-angled triangles in three-dimensional shapes and use trigonometry to find missing sides and angles. **Data** Understand different data types and data collection/ sampling strategies, including their relative merits. Understand methods of collating and presenting data including bar and pie charts and line graphs for time series, comparing and recognising trends. Understand when graphs are misleading. Plot bivariate data, recognising outliers and correlation. Draw and use lines of best fit. Construct and interpret cumulative frequency graphs and box plots. Use median and ranges to comment on distributions. Calculate estimates of statistical measures from grouped data. Construct and interpret Histograms with unequal class intervals.



Phase 5

Year 10 Application and extension	Term 1	Term 2	Term 3
Review			• Recognise and use ratio notation, simplify ratios, compare ratios to fractions, decimals and percentages • Find missing sides in right-angled triangles given the other two sides • Model practical situations with right-angled triangles and so find missing lengths • Identify whether a triangle is right-angled by considering the lengths of its sides ·Share a quantity in a given ratio ·Solve simple ratio and proportion problems • Calculate the mean, median and mode and range of ungrouped data • Find the modal class of grouped data • Find estimates of the mean, median and range of grouped data • Make comparisons between sets of data using summary



Phase 5

Year 11 Application and extension	Term 1	Term 2	Term 3
Application and extension of key skills	**Geometry** Represent and calculate with two-dimensional vector as a column vector. Use vectors to prove geometric arguments. Use angle facts to find missing angles in increasingly complex situations, including justifying proofs. Prove and use angle facts within circles. Understand and use bearings. Undertake constructions and understand conditions for congruency. Undertake standard constructions to identify the locus of points following a given rule. **Algebra & Graphs** Form and solve inequalities in one or two variables. Use set notation or graphical representation to show solutions to inequalities. Solve quadratic inequalities. Solve problems involving coordinates and midpoints. Plot straight line graphs, understanding input and output and properties of parallel and perpendicular lines. Rearrange simple formulae. Create graphs of real-life situations and of other polynomials, exponential functions. Evaluate sine, cosine & tangents of angles greater than 900, sketching the graphs cos x and y = tan x and use them to solve simple trig equations.	Higher Course Only **Further algebra and graphs** Create more complex equations, including from real-world situations. Simplify and manipulate more complex equations, rearranging formulae where the subject appears more than once. Develop and critique simple mathematical arguments. Use algebraic reasoning to decide if expressions are equivalent. Construct algebraic proofs. Verify whether two straight lines are perpendicular. Understand the meaning of iteration, using iterative processes and recurrence formulae. Understand and use function notation, finding inverse and composite functions. Sketch and identify transformations of graphs. Find approximate solutions to equations through: Trial and improvement/decimal search. Sign change methods. Calculating estimates of gradients of graphs using gradients of tangents. Interpret gradients of real-world graphs. Calculate estimates of areas under graphs. Interpret areas under real-world graphs.	Consolidation and revision.