**YEAR 7 AUTUMN 1**

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| **Topic title:**  Algebraic Thinking | **Year: 7  Term: Autumn 1** | **Why we teach this:**  Helps students to understand number properties without simply applying the operations. | **Why we teach this here:**  Students are introduced to missing number problems in Primary school but have likely not seen representations of algebra. Algebra is used in many problem-solving aspects throughout maths. | |
| **Big questions:**   1. How can I represent this problem? 2. How can algebra be used to tell a story? 3. How can we describe number patterns? 4. How can we use a function machine to solve problems? 5. How can we apply the four operations to algebra problems? | | **Builds on previous topics:**  - Links to previous understanding of missing number problems, and picture sequences. - Builds on understanding of place value, and number operations as well as pattern spotting. | **Links to future topics:**  - Solving equations  - Forming and solving problems. - Algebra is used throughout further study of maths. | |
| **Key knowledge:**   * Can continue and describe sequences. * Understand linear and non-linear sequences. * Explain the term-to-term rule. * Understand connections between sequences and graphs. * Can set up and use function machine. * Understand inverse operations and to find an input given an output. * Understanding simple expressions * Can substitute values into an expression. * Can use a function machine to create a two-step function. | **Key knowledge continued:**   * Generate sequences given an algebraic rule. * Understand fact families, numerically and algebraically. * Solve one-step linear equations using +/- * Solve one-step linear equations using multiply and divide. * Can collect like terms. * Understand equivalence. | |
| **Skills developed:**  -Deepened understanding of four operations  -Identifying patterns in maths  -Use of algebra to represent models.  -Collecting like terms.  -Understanding equivalence.  -Can identify the rule for sequences and make connections to graphical representations.  -Can use and understand a function machine. | |
| **Mini/Interim assessments:**  End of topic post-test. **Termly summative assessment:**  End of term assessment. | | **Independent study tasks/resources:**  … | **Key vocabulary 1:** -Sequence  -Term  -Position  -Rule  -Linear  -Variable  -Difference.  -Arithmetic  -Geometric.  -Function  -Input | **Key vocabulary 2:**  -Output  -Operation  -Inverse  -Equivalence  -Equality  -Solve  -Simplify  -Unlike  -Like terms  -Expression  -Identity |
| **Cultural capital opportunities:** … | | **Whole school Curricular Concept links:** Technological Progress –Algebra is used the computer programming and design.  Precious Planet – Climate control is modelled using algebra |

**YEAR 7 AUTUMN 2.**

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| **Topic title:**  Place Value and Proportion | **Year: 7  Term: Autumn 2** | **Why we teach this:**  Place value forms the very basics of mathematical understanding. | **Why we teach this here:**  It solidifies students’ understanding of number. | |
| **Big questions:**   1. What is place value? 2. What do we mean by base 10? 3. How can we represent different numbers? 4. How can we order numbers? 5. What is a fraction? 6. How can we represent fractions? | | **Builds on previous topics:**  - Knowledge obtained in KS2 maths. | **Links to future topics:**  Multiplying and dividing fractions  Addition and subtraction of fractions.  Understanding percentage and fractions of amount. | |
| **Key knowledge:**   * Recognise value in any integers. * Understand and write integers in words and numbers. * Work out intervals. * Order integers. * Round to the nearest power of 10. * Compare using inequality and equality symbols. * Find the range and median of a set of numbers. * Understand place value for decimals. * Position decimals on number line. * Standard form (Higher only) | **Key knowledge continued:**   * Represent 10ths and 100ths on a number line. * Convert between fractional and decimal number lines. * Convert between fractions and decimals (10ths and 100ths) * Convert between fractions and decimals (fifths and quarters). * Understanding meaning of percentage. * Convert between simple fractions, decimals and percentages. * Use and interpret pie charts. * Represent any fraction as a diagram. * Represent fractions on number line. * Identify and use equivalent fractions. * Understand fractions as division. | |
| **Skills developed:**  -Ordering numbers.  -Representing numbers and understanding intervals.  -Range and median.  -Place Value.  -Fractions, decimals and percentages conversions | |
| **Mini/Interim assessments:**  Post-test end of topic **Termly summative assessment:**  End of term test. | | **Independent study tasks/resources:** | **Key vocabulary 1:**  -Approximate -Integer  -Interval  -Median  -Negative  -Place Holder  -Order.  -Powers.  -Significant Figure.  -Rounding.  -Estimation. | **Key vocabulary 2:**  -Fraction  -Decimal  -Percentage  -Tenth  -Hundredth  -Placeholder  -Sector  -Recurring. |
| **Cultural capital opportunities:** … | | **Whole school Curricular Concept links:** - Social Justice – Being numerate opens up opportunities to people of all ages.  -Cultural Diversity – Many students were educated in different countries prior to KS3 and the focus is on key words.  Civic Responsibility – We have a duty to the students to make sure they are numerate. |

**YEAR 7 SPRING 1**

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| **Topic title:**  Applications of Number. | **Year: 7  Term: Spring 1** | **Why we teach this:**  Helps students begin to solve problems with number, and form representations which may help them. | **Why we teach this here:**  Follows on directly from Autumn term. Leads into Summer 1 and geometry problems. | |
| **Big questions:**   1. **Why do we work in base 10?** 2. **What is an inverse operation?** 3. **How can we use representations to help us solve problems?** 4. **What is the connection between factors and multiples?** 5. **How can we use fractions and percentages as an operation?** | | **Builds on previous topics:**  Builds on understanding of place values. | **Links to future topics:**  Forms part of the building blocks of all further problem solving in maths. | |
| **Key knowledge:**  -Mental strategies for addition and subtraction.  -Formal methods for addition and subtraction.  -Financial problems.  -Perimeter.  -Frequency trees.  -Lines and bar charts.  -Add and subtract numbers in standard form.  -Properties of multiplication and division.  -Understand and use factors and multiplies.  -Divide by powers of ten.  -Convert metric units. | **Key knowledge continued:**  -Formal methods for multiplication.  -Formal methods for division.  -Multiply decimals.  -Divide decimals.  -Order of operations.  -Area of rectangles and parallelograms.  -Area of triangles and trapezia.  -Using the mean.  -Find fraction of amount.  -Fractions of a whole.  -Percentage of amount. | |
| **Skills developed:**  •Recognise number relationships, including inverse operations.  •Construct tables, charts and diagrams.  •Develop calculation strategies for increasing different problem-solving activities.  •Substitute values into formulae.  •Interpret fractions and percentages as operators. | |
| **Mini/Interim assessments:**  End of topic post-test. **Termly summative assessment:**  End of term assessment. | | **Independent study tasks/resources:**  … | **Key vocabulary 1:** -Commutative.  -Associative.  -Inverse.  -Placeholder.  -Perimeter.  -Polygon.  -Balance.  -Credit.  -Debit.  -Array.  -Multiples.  -Factors | **Key vocabulary 2:**  -Mili  -Centri  -Kilo  -Quotient.  -Dividend.  -Divisor.  -Fraction.  -Equivalent.  -Whole.  -Percentage.  -Place Value.  -Convert. |
| **Cultural capital opportunities:** … | | **Whole school Curricular Concept links:** Social Justice - Being able complete quick calculations with money will mean that you can always check you have the correct change.  Creative Artistry - Architects use area and accurate drawing when designing buildings. |

**YEAR 7 SPRING 2**

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| **Topic title:**  Directed Number and Fractional thinking. | **Year: 7  Term: Spring 2** | **Why we teach this:**  Builds on understanding of fractions as an operator from Spring 1. Fractions are also commonly used in science, geography, DT and many aspects of real life. | **Why we teach this here:**  Follows on from fraction of amount. Builds on the understanding of fraction as an operator. | |
| **Big questions:**   1. How can we represent ---- 2. What are the connections between multiplication and division? 3. Can we create a general rule for addition and subtraction from fractions? 4. How can we add and subtract fractions with different denominators? | | **Builds on previous topics:**   * Use of conventional notation and priority for operations. * -Forming and solving linear equations * Finding the range and median. * Substitution into algebraic formulae. | **Links to future topics:** | |
| **Key knowledge:**   * Understand and use representations of direct number. * Order numbers. * Perform calculations. * Add directed numbers. * Subtract directed numbers. * Multiplication of directed numbers. * Division of directed numbers. * Evaluate algebraic expressions with algebraic expressions with directed numbers. * Two-step equations. * Order of operations. | **Key knowledge continued:**   * Understand representations of fractions. * Convert between mixed numbers and fractions. * Add and subtract fractions with the same denominator. * Simplifying fractions. * Understand and use equivalent fractions. * Add and subtract fractions with different denominators. * Add and subtract fractions with any number. * Solve algebraic fractions. * Add and subtract fractions and decimals. | |
| **Skills developed:**   * Select and use appropriate calculation strategies. * Recognise and use number relationships. * Use square and square roots. * Use calculator effectively. * Simplify and manipulate algebraic expressions. * Move freely between representations. * Use of inequality and equality symbols. | |
| **Mini/Interim assessments:**  End of topic post-test. **Termly summative assessment:**  End of term assessment. | | **Independent study tasks/resources:**  … | **Key vocabulary 1:** -Subtract.  -Negative.  -Commutative.  -Product.  -Inverse.  -Square root.  -Square.  -Expression. | **Key vocabulary 2:**  -Numerator.  -Denominator.  -Equivalent.  -Mixed Number.  -Improper Fractions.  -Substitute.  -Place Value. |
| **Cultural capital opportunities:** … | | **Whole school Curricular Concept links:** Precious Planet - Climatologists measure the earth’s temperature to check on global warming. We need to keep our polar regions cold to sustain the planet’s ambient temperature.  Social Justice – Understanding finances can prevent debt. |

**YEAR 7 SUMMER 1**

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| **Topic title:**  Lines and Angles | **Year: 7  Term: Summer 1** | **Why we teach this:**  Lines and Angles are used heavily in the construction and design industries. Having a good understanding of shape properties can help solve many problems | **Why we teach this here:**  Builds on understanding of sequences and leads into angle properties and geometric reasoning which is covered in year 8. | |
| **Big questions:**   1. **What is an angle?** 2. **How can we measure an angle?** 3. **Can you prove the angles in a triangle add up to 180 degrees?** 4. **How can we apply our knowledge of angles to pie charts?** | | **Builds on previous topics:**  -Builds on understanding of the four operations.  -Forming linear equations.  -Addition and subtraction, including decimals. | **Links to future topics:**    Directly leads into Year 8 SUM1. | |
| **Key knowledge:**   * Understand geometric notation. * Draw and measure line segments. * Understand angles as measure of turn. * Classify angles. * Measure angles up to 360 degrees. * Draw angles up to 360 degrees. * Identify parallel and perpendicular lines. * Recognise types of triangles. * Recognise types of quadrilaterals. * Identify polygons up to a decagon. * Construct using SSS, SAS and ASA. * Interpret/draw pie charts. | **Key knowledge continued:**  -Understand sum of angles around a point.  -Understand and use sum of angles on straight line.  -Vertically opposite angles.  -Know sum of angles in a triangle.  -Know the sums of angles in a quadrilateral.  -Solve angle problems. | |
| **Skills developed:**   * Language and properties associated with 2D shapes. * Begin to reason deductively. * Draw and measure line segments and angles in geometric figures. * Describe, sketch and draw using conventional means. * Construct and interpret pie charts. * Identify and construct angles. * Derive and apply angle properties. | |
| **Mini/Interim assessments:**  End of topic post-test. **Termly summative assessment:**  End of term assessment. | | **Independent study tasks/resources:**  … | **Key vocabulary 1:** -Polygon.  -Scalene Triangle.  -Isosceles Triangle.  -Right-angled triangle.  -Frequency.  -Sector.  -Rotation.  -Protractor.  -Compass. | **Key vocabulary 2:**  -Vertically Opposite.  -Interior Angles.  -Sum.  -Convex Quadrilateral.  -Concave Quadrilateral. |
| **Cultural capital opportunities:** …   * Measuring and using scales is a practical skill used in all aspects of life: baking, decorating etc. * Angles used in architecture, design, building, room design. | | **Whole school Curricular Concept links:** Creative Artistry - Architects use accurate drawings when designing buildings and other structures. |

**YEAR 7 SUMMER 2**

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| **Topic title:**  Reasoning with Number | **Year: 7  Term:** Summer 2 | **Why we teach this:**  Having a good understanding of number problems enables students to answer problems quickly, both in other subjects and out in the real world. | **Why we teach this here:**  Proof builds a deeper understanding of number properties and helps to solidify understanding, and form builds on all topics covered in the year. | |
| **Big questions:**   1. How can we interpret a Venn Diagram? 2. How can we represent probabilities? 3. What is a prime number? 4. How can we find the LCM? 5. What is the connection between Venn Diagrams and prime factorisations? | | **Builds on previous topics:**  **-**Factors and multiples.  -Generating and describing sequences.  -Forming and solving equations FDP.  -Adding and subtracting fractions. | **Links to future topics:**   * Probability leads into year 8 AUTUMN 2 | |
| **Key knowledge:**  -Mental addition and subtraction strategies.  -Mental multiplication and division strategies.  -Mental calculations with fractions and decimals.  -Use number facts.  -Identify and represent sets.  -Interpret and create Venn Diagrams.  -Use and understand intersection of sets.  -Understand and use union.  -Generate sample spaces. | **Key knowledge continued:**  -Know the sum of probabilities for all possible outcomes is 1.  -Use the probability scale.  -Find and use multiples.  -Identify factors.  -Recognise and identify prime numbers.  -Recognise square and triangular numbers.  -Find HCF.  -Find LCM.  -Write a number as product of prime factors. | |
| **Skills developed:**   * Consolidate numerical and mathematical capability from previous KS. * Select appropriate strategies. * Begin to reason deductively. * Record, describe and analyse frequency of outcomes. * Understand probability. * Use integer powers and associated roots. | |
| **Mini/Interim assessments:**  End of topic post-test. **Termly summative assessment:**  End of term assessment. | | **Independent study tasks/resources:**  … | **Key vocabulary 1:** -Communicative.  -Associative.  -Dividend.  -Divisor.  -Expression.  -Equation.  -Quotient.  -Set  -Element.  -Intersection.  -Union.  -Mutually Exclusive. | **Key vocabulary 2:**  -Probability.  -Bias.  -Fair.  -Random.  -Multiples  -Factor.  -Prime.  -Conjecture.  -Counterexample.  -Expression.  -HCF  -LCM |
| **Cultural capital opportunities:** … | | **Whole school Curricular Concept links:** SOCIAL JUSTICE   * Understanding finances can reduce/prevent debt. |

**MATHS YEAR 8 AUTUMN 1**

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| **Topic title:**  Proportional reasoning. | **Year: 8  Term: Autumn 1** | **Why we teach this:**  Multiplicative reasoning builds on skills developed in year 7 and KS2. And help students set up and solve problems. | **Why we teach this here:**  It offers a chance for students to consolidate and extend their knowledge of the number system from KS2. And select appropriate strategies to solve problems. | |
| **Big questions:**   1. What is the connection between fractions and ratio? 2. How can we use ratios to solve problems? 3. What are similar shapes and when would we see them in real life? 4. How can we represent a fraction? 5. When would we need to multiply and divide by fractions? | | **Builds on previous topics:**  -Students have had minimal experience of multiplying and dividing fractions in KS2, and this builds on understanding from Spr2 of Year 7.  - Builds on understanding of place value, and number operations as well as pattern spotting. | **Links to future topics:**  -Probability  -Scale drawings  -Solving equations  -Direct and Indirect proportion. | |
| **Key knowledge:**   * Understand representations of ratio. * Solve problems involving ratios, including dividing into a ratio. * Compare ratios and fractions. * Understand Pi as a ratio * Simple direct proportion. * Conversion graphs including currency. | **Key knowledge continued:**   * Similar shapes including scale factors. * Drawing and interpreting scale diagrams. * Represent fractions. * Multiply by a fraction. * Dividing by a fraction. * Simple algebraic fractions. | |
| **Skills developed:**  -Make connections between number relationships, algebraic and graphic representations  -Scale factors, scale diagrams and maps.  -Understand multiplicative relationships.  -Divide into ratios.  -Working in measures and formulating proportional relationships. | |
| **Mini/Interim assessments:**  End of topic mini-tests **Termly summative assessment:**  Christmas | | **Independent study tasks/resources:**  KAO | **Key vocabulary 1:** -Ratio  -Proportion  -Order  -Part  -Equivalent  -Factors  -Scale  -Variable  -Axes | **Key vocabulary 2:**  -Approximation  -Scale Factor  -Currency  -Conversion  -Numerator  -Denominator  -Whole  -Commutative  -Unit Fraction |
| **Cultural capital opportunities:** …  Map reading/cross curricular | | **Whole school Curricular Concept links:** Creative Artistry – Golden ratio has been used throughout history. |

**MATHS YEAR 8 AUTUMN 2**

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| **Topic title:**  Representations. | **Year: 8  Term: Autumn 2** | **Why we teach this:**  For students to gain a conceptual understanding of representations before they are asked to solve problems. | **Why we teach this here:**  To help students understand the connections between algebra and representations of data and gain a conception understanding before they are asked to complete problem-solving activities. | |
| **Big questions:**   1. How are sequences and linear graphs linked? 2. What do we mean by a variable? 3. How can we compare two variables? 4. What is chance? 5. How can we measure chance? | | **Builds on previous topics:**  - Understanding of coordinates from KS2.  - Small probability module from Year 7 | **Links to future topics:**  Students can explore gradient but the focus is using equations to draw lines, this leads into year 9. | |
| **Key knowledge:**   * Working with coordinates. * Recognise lines parallel to the axes and line y=x. * Use lines in the form y=kx and link that to direct proportion problems. * Explore the gradient of a straight line. * Link graphs to linear sequences * Plot graphs in the form y=mx + c * Draw and interpret scatter graphs. * Understand linear correlation. * Draw a line of best fit. | **Key knowledge continued:**   * Identify types of data. * Read and interpret grouped and ungrouped frequency tables. * Understand and use two-way tables. * Construct sample space diagrams. * Find probabilities. * Understanding probabilities sum to one. * Find probabilities from sample space diagrams. * Find probabilities from Venn diagrams. | |
| **Skills developed:**  --Direct and inverse proportion  -Understand linear and simple quadratic functions.  -Substitutions into formulae and expressions.  -Construct, use and interpret charts, tables, diagrams and graphs.  -Describe relationships between two variables.  -Record, describe and analyse the outcomes of probability experiments. | |
| **Mini/Interim assessments:**  Post-tests at the end of each unit. **Termly summative assessment:**  Assessment at Christmas. | | **Independent study tasks/resources:**  KAO, Seneca, Mymaths. | **Key vocabulary 1:** -Quadrant  -Coordinate  -Horizontal  -Vertical  -Origin  -Parallel  -Gradient  -Intercept  -Variable  -Relationship  Correlation  -Line of best fit  -Outlier | **Key vocabulary 2:**  -Quantitative  -Qualitative  -Continuous  -Discrete  -Frequency  -Outcomes  -Probability  -Set  -Chance  -Event  -Even  -Biased  -Union |
| **Cultural capital opportunities:** …  Cross curricular with science | | **Whole school Curricular Concept links:** Civic Responsibility – Data analysis is used by the government to ensure that the appropriate services are available for given communities.  Precious Planet – Scientists analyse all kinds of data to monitor the earth’s climate. They also use probability models to try to see where trends will lead. |

**YEAR 8 SPRING 1**

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| **Topic title:**  Algebraic Techniques | **Year: 8  Term:** SPRING 1 | **Why we teach this:**  Builds on understanding gained from year 7. Helps students to spot patterns and solve problems. | **Why we teach this here:**  It builds on an understanding of algebraic notation from year 7. And links into quadratics in year 9. | |
| **Big questions:**   1. What is the difference between and expression and an equation? 2. What is factorising? 3. How can we form expressions? 4. How can we generate sequences from a given rule? 5. How can we calculate with indices? | | **Builds on previous topics:**  Revises algebraic notation used in year 7. | **Links to future topics:**  Links to calculations in standard form in next term. | |
| **Key knowledge:**  -Form algebraic expressions.  -Use directed number with algebra.  -Multiply out a single bracket.  -Factorise a single bracket.  -Expand multiple single brackets and simplify.  -Solve equations – including brackets.  -Form and solve equations.  -Understand and solve simple inequalities.  -Form and solve inequalities.  -Solve equations with unknowns on both sides.  -Identify and use formulae, expressions, identities and equations. | **Key knowledge continued:**  -Generate sequences given a rule in words.  -Generate sequences given an algebraic rule.  -Generate sequences given a complex rule.  -Adding and subtracting expressions with indices.  -Simplifying algebraic expressions by multiplying indices.  -Simplifying algebraic expressions by dividing indices.  -Addition law for indices.  -Addition and subtraction rule for indices. | |
| **Skills developed:**   * Identify variables and express relationships algebraically. * Begin to model situations mathematically. * Substitute values into formulae – including scientific. * Simplify and manipulate algebraic expressions. * Generate and recognise sequences. * Interpret algebraic notation including indices. | |
| **Mini/Interim assessments:**  End of topic post-test. **Termly summative assessment:**  End of term assessment. | | **Independent study tasks/resources:**  … | **Key vocabulary 1:** -Simplify.  -Substitute.  -Equivalent.  -Coefficient.  -Product.  -Highest Common Factor.  -Inequality.  -Sequence.  -Term.  -Position. | **Key vocabulary 2:**  -Linear.  -Non-linear.  -Difference.  -Arithmetic.  -Geometric.  -Base.  -Power.  -Exponent.  -Indices.  -Coefficient.  -Product. |
| **Cultural capital opportunities:** …  Use of scientific formulae, substitution used in geography, and science.  Use of formulae in medicine. Using equations and inequalities to solve real life problems, where we are not given all variables in a problem. | | **Whole school Curricular Concept links:** Technological Progress – Algebra has formed the basis for computer programming, and mathematical modelling. |

**YEAR 8 SPRING 2**

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| **Topic title:**  Developing Number | **Year:** 8 **Term:** SPRING 2 | **Why we teach this:** | **Why we teach this here:**  Builds on knowledge of indices from previous term. Builds into geometry in next half term. | |
| **Big questions:**   1. What is the connection between fractions and percentages? 2. How can I calculate a percentage and a fraction of amount? 3. Why would it be useful to write a number in standard form? 4. Why is accurate rounding important? 5. Why do we use estimation to check answers? | | **Builds on previous topics:**  Follows on from work on indices in previous term. Builds on understanding of fraction equivalences from year 7 | **Links to future topics:**  Links to interest calculations, and depreciation calculations within maths. Percentage increase and decrease in science. | |
| **Key knowledge:**  -Convert between fractions, decimals and percentages.  -Calculate key fractions, percentages and decimals of amount without a calculator.  -Calculate key fractions, percentages and decimals of amount with a calculator.  -Convert between percentages and decimals including greater than 100%  -Percentage increase and decrease with a multiplier.  -Express a number as a fraction or percentage of another.  -Investigate powers of 10.  -Work with numbers greater than 1 in standard form. | **Key knowledge continued:**  -Investigate negative powers of ten.  -Work with numbers between 0-1 in standard form.  -Compare and order numbers in standard form.  -Add and subtract numbers in standard form.  -Multiply and divide numbers in standard form.  -Round to powers of 10 and to one significant figure.  -Round numbers to decimal places.  -Estimate answers.  -Use orders of operation.  -Money calculations.  -Metric conversions.  -Time. | |
| **Skills developed:**   * Develop mathematical knowledge to interpret and solve problems including finance. * Work interchangeably with terminating decimals and their corresponding fractions. * Define and interpret percentages. * Use integer powers and real roots. * Standard form. * Standard units of mass, length, time, money etc. * Round numbers. * Approximation. | |
| **Mini/Interim assessments:**  End of topic post-test. **Termly summative assessment:**  End of term assessment. | | **Independent study tasks/resources:**  … | **Key vocabulary 1:** -Percent.  -Decimal.  -Fraction.  -Equivalent.  -Reduce.  -Growth.  -Integer.  -Invest.  -Standard (index) form.  -Commutative.  -Base.  -Power. | **Key vocabulary 2:**  -Exponent.  -Indices.  -Negative.  -Significant.  -Round.  -Decimal.  -Overestimate.  -Underestimate.  -Metric.  -Balance.  -Deposit |
| **Cultural capital opportunities:** …  Percentages are used in daily life, credit cards, loans, saving accounts.  Standard form is used by scientists to calculate with very large and very small numbers.  Rounding and estimation makes money calculations quick, and helps prevent bad money decisions. | | **Whole school Curricular Concept links:** Social Justice  Percentages are used in daily life, credit cards, loans, saving accounts.  Precious Planet  Standard form is used by scientists to calculate with very large and very small numbers. |

**YEAR 8 SUMMER 1**

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| **Topic title:**  Developing Geometry | **Year:** 8 **Term:** Summer 1 | **Why we teach this:**  To help students understand the world around them. | **Why we teach this here:**  It builds on year 7 knowledge of angle sums, and helps students to see the sum of angles in other polygons. | |
| **Big questions:**   1. How can we solve problems involving angles in parallel lines? 2. How can we calculate the sum of angles in a polygon? 3. What is pi? 4. When might we use reflections in real life? | | **Builds on previous topics:**  KS2 and year 7 angle notation and relationships. | **Links to future topics:**  Rotations and translations covered in year 9. | |
| **Key knowledge:**  -Understand and use basic angle rules.  -Investigate angles between parallel lines.  -Identify and calculate alternate and corresponding angles.  -Identify and calculate co-interior, alternate and corresponding angles.  -Solve complex problems with angles.  -Constructions of triangles.  -Properties of special quadrilaterals.  -Identify and calculate with sides and angles in special quads.  -Understand and use the sum of exterior angles in a polygon.  -Calculate and use the sum of interior angles in a polygon. | **Key knowledge continued:**  -Calculate the area of triangles, rectangles, and parallelograms.  -Calculate the area of a trapezium.  -Calculate the perimeter and area of compound shapes.  -Investigate the area of a circle.  -Calculate the area of a circle in exact form.  -Calculate the area of a circle with a calculator.  -Area and perimeter of compound shapes.  -Recognise line symmetry.  -Reflect a shape in a horizontal or vertical line.  -Reflect a shape in a diagonal line. | |
| **Skills developed:**   * Apply properties of angles at a point, straight line and vertically opposite angles. * Understand and use relationships between parallel lines, alternate and corresponding angles. * Derive and use sum of angles in a triangle and regular polygons. * Derive and apply formulae to calculate and solve problems. * Calculate problems with perimeters of 2d shapes. * Describe, sketch and draw using conventional terms and notations. | |
| **Mini/Interim assessments:**  End of topic post-test. **Termly summative assessment:**  End of term assessment. | | **Independent study tasks/resources:**  … | **Key vocabulary 1:** -Parallel.  -Angle.  -Transversal.  -Isosceles.  -Polygon.  -Sum.  -Regular polygon.  -Congruent.  -Area.  -Perimeter. | **Key vocabulary 2:**  -Pi.  -Perpendicular.  -Formula.  -Infinity.  -Sector.  -Mirror line.  -Line of symmetry.  -Reflect.  -Vertex.  -Horizonal  -Vertical. |
| **Cultural capital opportunities:** …  Design and technology – use of reflections.  Science – reflection. | | **Whole school Curricular Concept links:** Precious Planet  Help stu |

**YEAR 8 SUMMER 2**

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| **Topic title:**  Reasoning with Data | **Year:** 8 **Term:** SUMMER 2 | **Why we teach this:**  To allows students time to gather data and information and create their own theories to be tested. | **Why we teach this here:**  Builds on prior knowledge of charts and representation. | |
| **Big questions:**   1. What is a hypothesis? 2. Why do we need to test hypothesises? 3. How can we determine the best representation of data? 4. Why do we use the mean/mode/median? 5. What is the difference between grouped and ungrouped data? | | **Builds on previous topics:**  Charts have been used in year 7 an earlier in year 8. The focus is to compare the different representations. And also to select which average to use. | **Links to future topics:** | |
| **Key knowledge:**  -Set up a statistical enquiry.  -Design and criticise questionnaires.  -Draw and interpret pictograms, bar charts and vertical line charts.  -Draw and interpret multiple bar charts.  -Draw and interpret pie charts.  -Draw and interpret line graphs.  -Use appropriate representations of diagrams. | **Key knowledge continued:**  -Represent and interpret grouped quantitative data.  -Find the range.  -Compare distributions.  -Understand and use the mean, median and mode.  -Choose the most appropriate average.  -Find the mean from an ungrouped frequency table.  -Find the mean from a grouped frequency table.  -Identify outliers. | |
| **Skills developed:**   * Describe, interpret and compare distributions of single variables. * Consider spread (range and outliers) and central tendency (mean, mode and median) * Construct and interpret tables, charts and diagrams. * Describe and compare observed distributions**.** | |
| **Mini/Interim assessments:**  End of topic post-test. **Termly summative assessment:**  End of term assessment. | | **Independent study tasks/resources:**  … | **Key vocabulary 1:** -Hypothesis.  -Sampling.  -Primary data.  -Secondary data.  -Discrete data.  -Continuous data.  -Spread. | **Key vocabulary 2:**  -Average.  -Proportion.  -Total.  -Frequency.  -Represent.  -Outlier.  -Consistent. |
| **Cultural capital opportunities:** …  Data and statistics are used in business, in news, by the government, in schools. | | **Whole school Curricular Concept links:** Technological Progress  Scientists test theories and then analyse the data. |

**YEAR 9 AUTUMN 1**

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| **Topic title:**  Graphs and Proportion | **Year: 9 Term: Autumn 1** | **Why we teach this:**  Co-ordinates and graphs form the basis for the analysis of the equation of a straight line.  Proportion work readies students for working with direct and inverse proportion at KS4 | **Why we teach this here:**  Builds from understanding of algebra in year 7 and 8. Also allows students to form an algebraic representation of proportion. | |
| **Big questions:**   1. **What is the equation of a linear graph?** 2. **What is the gradient?** 3. **What is the difference between direct and inverse proportion?** 4. **Why is standard form sometimes called scientific notation?** | | **Builds on previous topics:**  - Forming and solving equations  - Basic ratio | **Links to future topics:**  Graphical solutions (spr2)  Similarity (Sum2) | |
| **Key knowledge:**   * Plotting coordinates. * Solving shape problems involving coordinates. * Midpoints and endpoints. * Understanding gradient. * Understanding the y-intercept. * Working with tables of values. * Plotting linear graphs. | **Key knowledge continued:**   * Understanding real life graphs.   Understanding proportion relationships.   * Calculating values that are in direct proportion. * Identifying proportion graphs. * Calculations in standard form. * Real-life applications of standard form. | |
| **Skills developed:**  - Use of a coordinate grid including plotting, reading and midpoints  -Graphical presentation of proportion  -Working in standard form | |
| **Mini/Interim assessments:**  Post-tests **Termly summative assessment:**  Christmas (20% of year) | | **Independent study tasks/resources**  KAO, Seneca learning, mymaths. | **Key vocabulary 1:** -Coordinate  -Linear  -Axis/Axes  -Midpoint  -End point.  -Value  -Substitute  -Graph  -Plot | **Key vocabulary 2:**  -Proportion  -Direct (proportion)  -Inverse (proportion)  -Standard form  -Scientific notation  -Significant figure.  -Index |
| **Cultural capital opportunities:** …  - Students are exposed to a variety of graphs, much like in newspapers.  - Students learn about very small and very large measures and the real-life entities they belong to. | | **Whole school Curricular Concept links:** - Technological Progress  -Precious Planet. |

**YEAR 9 AUTUMN 1**

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| **Topic title:**  Graphs and Proportion | **Year: 9 Term: Autumn 1** | **Why we teach this:**  Co-ordinates and graphs form the basis for the analysis of the equation of a straight line.  Proportion work readies students for working with direct and inverse proportion at KS4  Standard form readies students to calculate with very large and very small numbers | **Why we teach this here:**  Builds from understanding of algebra in year 7 and 8. Also allows students to form an algebraic representation of proportion. | |
| **Big questions:**   1. **What is the equation of a linear graph?** 2. **What is the gradient?** 3. **What is the difference between direct and inverse proportion?** 4. **Why is standard form sometimes called scientific notation?** | | **Builds on previous topics:**  - Forming and solving equations  - Basic ratio | **Links to future topics:**  Graphical solutions (spr2)  Similarity (Sum2) | |
| **Key knowledge:**   * Plotting coordinates. * Solving shape problems involving coordinates. * Midpoints and endpoints. * Understanding gradient. * Understanding the y-intercept. * Working with tables of values. * Plotting linear graphs. * Understanding real life graphs. | **Key knowledge continued:**   * Understanding proportion relationships. * Calculating values that are in direct proportion. * Identifying proportion graphs. * Calculations in standard form. * Real-life applications of standard form. | |
| **Skills developed:**  - Use of a coordinate grid including plotting, reading and midpoints  -Graphical presentation of proportion  -Working in standard form | |
| **Mini/Interim assessments:**  Post-tests **Termly summative assessment:**  Christmas (20% of year) | | **Independent study tasks/resources**  KAO, Seneca learning, mymaths. | **Key vocabulary 1:** -Coordinate  -Linear  -Axis/Axes  -Midpoint  -End point.  -Value  -Substitute  -Graph  -Plot | **Key vocabulary 2:**  -Proportion  -Direct (proportion)  -Inverse (proportion)  -Standard form  -Scientific notation  -Significant figure.  -Index |
| **Cultural capital opportunities:** …  - Students are exposed to a variety of graphs, much like in newspapers.  - Students learn about very small and very large measures and the real-life entities they belong to. | | **Whole school Curricular Concept links:** - Technological Progress  -Precious Planet. |

**YEAR 9 AUTUMN 2**

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| **Topic title:**  Algebraic Expressions | **Year: 9  Term: Autumn 2** | **Why we teach this:**  Modelling real life situations using algebra – a problem solving process that everyone needs even if they don’t write down expressions. | **Why we teach this here:**  Follows on from earlier learning on straight line graphs. Links sequences to straight line graph representations. | |
| **Big questions:**   1. How can we represent sequences algebraically? 2. What do we mean by expand a bracket? 3. Why would we need to factorise an expression? 4. When might you need to change the subject of a formula? | | **Builds on previous topics:**  Sequence work builds on previous learning of co-ordinates.  Expanding and factorising builds on year 8 work of expressions  Changing the subject builds on work involving inverse operations and solving equations in year 8 | **Links to future topics:**  Sequences continues at KS4 with Fibonacci and quadratic sequences.  This work culminates in solving quadratic equations by factorising.  Changing the subject becomes more complex at KS4 with students exploring indices | |
| **Key knowledge:**   * Continue and complete sequences. * Find missing terms. * Describe a sequence algebraically. * Determine if a number is part of a sequence. * Expand a single bracket. * Factorise an expression into a single bracket. * Expand a double bracket. * Factorise a quadratic. | **Key knowledge continued:**   * Rearrange simple formula to make another variable the subject. * Understand inverse operations. * Substitution | |
| **Skills developed:**  - Generating and finding the rule for sequences  -Expanding and factorising quadratics  -Substitute values into formula  -Use inverse operations to change the subject | |
| **Mini/Interim assessments:**  Post-tests  **Termly summative assessment:**  Christmas assessment (20%) | | **Independent study tasks/resources:**  KAO, Seneca Learning, Mymaths. | **Key vocabulary 1:** -Linear  -Non-linear  -Sequence  -Arithmetic  -Geometric  -nth term  -Quadratic  -Term  -Factorise  -Expand | **Key vocabulary 2:**  -Substitute  -Formula  -Inverse  -Subject |
| **Cultural capital opportunities:** …  Predicting trends by reflecting on sequences in data  Modelling real life situations using algebra – a problem solving process that all students need. | | **Whole school Curricular Concept links:** - Technological Progress.  -Creative Artistry. |

**YEAR 9 SPRING 1**

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| **Topic title:**  **2D Geometry** | **Year: 9  Term: Spring 1** | **Why we teach this:** | **Why we teach this here:** | |
| **Big questions:**   1. How can we use a protractor and compass to construct a given triangle? 2. How can we determine if triangles are congruent? 3. What is the hypotenuse? | | **Builds on previous topics:**  Builds on previous construction work (triangles and quadrilaterals); work with 2d shapes (area and perimeter) and calculating missing angles in triangles and parallel lines | **Links to future topics:**  Leads on to Loci at KS4 and construction of angles without a protractor.  Solving problems (involving reasoning) with Pythagoras is prominent at KS4 and is also a lead into Trigonometry.  Eventually this work will support circle theorems and more extensive problem solving | |
| **Key knowledge:**   * Constructing triangles * Constructing perpendicular bisectors. * Bisecting an angle. * Loci * Understand congruence. * Can use ASA, SSS, SAS AND RHS rules to prove triangles are congruent. * Can identify and label sides of a right-angled triangle. * Can find the hypotenuse on a right-angled triangle given two other sides. | **Key knowledge continued:**   * Can find any missing side on a right-angled triangle. * Can solve problems with trapezia and equilateral triangles using Pythagoras. * Understanding angle sums in triangles and quadrilaterals. * Can apply (n-2)x 180 to find the sum of angles in a specific shape. * Can find missing angles by applying angle rules. | |
| **Skills developed:**  -Use of mathematical equipment  -Understanding of congruence in triangles  -Use of Pythagoras theorem  -Knowledge of angle facts for polygons and properties of shapes | |
| **Mini/Interim assessments:**  Post-test  **Termly summative assessment:**  Easter assessment. | | **Independent study tasks/resources:**  KAOs, Seneca Learning, Mymaths. | **Key vocabulary 1:** -Triangle  -Quadrilateral  -Construction  -Protractor  -Compass  -Bisect  -Loci  -Congruent  -Similarity  -Angle | **Key vocabulary 2:**  -Hypotenuse  -Pythagoras  -right-angle  -edge  -vertex |
| **Cultural capital opportunities:** …  Enabling students to measure and construct accurately using equipment that they may not have access to at home. | | **Whole school Curricular Concept links:** - Technological progress  -Creative Artistry |

**YEAR 9 SPRING 2**

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| **Topic title:**  Equations and Inequalities | **Year: 9  Term: Spring 2** | **Why we teach this:**  Equations, inequalities and graphs are an excellent ay of modelling real life situations and finding solutions. | **Why we teach this here:**  Builds on earlier understanding of algebra and sequences from the Autumn term. | |
| **Big questions:**   1. What is the difference between an equation and an inequality? 2. How can I use inequalities to solve problems? 3. How can I use a graph to estimate solutions to quadratic equations/simultaneous equation? 4. How | | **Builds on previous topics:**  - Students will build on previous learning of solving equations and plotting linear graphs | **Links to future topics:**  This learning leads to solving equations graphically, including simultaneous equations. | |
| **Key knowledge:**   * Solve linear equations. * Linear equations in real life context. * Form and solve linear equations. * Solve linear equations with unknowns on both sides. * Discuss inequalities. * Representing inequalities. * Solving inequalities. * Solving inequalities with unknowns on both sides. | **Key knowledge continued:**   * Read and interpret real-life graphs. * Graphically solve simultaneous equations. * Real life graphs and graphical solutions. * Drawing and reading quadratic graphs. * Application of quadratic graphs. | |
| **Skills developed:**  - Solving any linear equation with unknowns on both sides.  -Understanding inequalities.  -Representing inequalities on a number line.  -Solving inequalities.  -Estimating and solving using graphs  -Real life graphs and their context. | |
| **Mini/Interim assessments:**  Post-test  **Termly summative assessment:**  Easter Assessment. | | **Independent study tasks/resources:**  KAO, Seneca Learning, Mymaths. | **Key vocabulary 1:** -Equation  -Expression  -Inequality  -Quadratic  -Parabola  -Curve  -Coordinate  -Axes/Axis  -Simultaneous | **Key vocabulary 2:**  -Linear  -Solve  -Estimate  - |
| **Cultural capital opportunities:** … | | **Whole school Curricular Concept links:** - Technological Progress  -Social Justice. |

**YEAR 7 SUMMER 1**

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| **Topic title:**  Data Handling and Probability. | **Year: 9  Term: Summer 1** | **Why we teach this:** | **Why we teach this here:** | |
| **Big questions:**   1. How can I use fractions/decimals/percentage to represent the probability of an occurrence? 2. What are mutually exclusive events? 3. How can I calculate the probability of multiple events? 4. How can I represent probabilities? 5. What is a line of best fit? 6. How can I describe the trends in data? | | **Builds on previous topics:**  - Probability builds on previous work with decimals, fractions and percentages as well as statistics  -Other statistical work builds on year 8 Summer term where students began calculating averages and creating diagrams | **Links to future topics:**  -This work extends later to successive probability, including probability trees and use of algebra to model probability | |
| **Key knowledge:**   * Understand probability scale. * Understanding probability language. * Theoretical probability and relative frequency. * Experimental probability. * Frequency of trials and how it may change the experimental probability. * Sample space diagrams. * Calculating the probability of combined events. * Two-way tables. * Understanding and using Venn diagrams. * Set notation. | **Key knowledge continued:**   * Calculating the mean. * Grouping data. * Calculating the mean from grouped data. * Calculating the median, and modal class of grouped data. * Reading and representing bivariate data from a table and graph. * Understand correction. * Plotting scatter graphs. | |
| **Skills developed:**  - Calculating probability  -Using measures and representations of data  -Plotting and analysing scatter graphs  -Identifying trends.  -Describing patterns.  -Analysing data.  -Representing data and using scatter graphs.  -Probability notation. | |
| **Mini/Interim assessments:**  Post-tests **Termly summative assessment:**  Summer assessment (50%) | | **Independent study tasks/resources:**  KAO, Seneca Learning, Mymaths. | **Key vocabulary 1:** -Fraction  -Decimal  -Percentage  -Change  -Likely  -Unlikely  -Impossible  -Definite  -Probability | **Key vocabulary 2:**  -Plot  -Correlation  -Negative  -Positive  -Line of best fit.  -Pattern  -Analyse. |
| **Cultural capital opportunities:** …  Mortgages and loans use probability when considering acceptance.  Data analysis and trend spotting are used in scientific enquiry. | | **Whole school Curricular Concept links:** - Technological |

**YEAR 9 SUMMER 2**

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| **Topic title:**  Geometry. | **Year: 9  Term: Summer 2** | **Why we teach this:**  Trigonometry is used extensively in constructions, as well as in mathematical modelling. | **Why we teach this here:**  Follows similar triangles and allows students to understand trigonometry as ratio of sides to angles. | |
| **Big questions:**   1. How can I tell if two shapes are similar? 2. What happens to the area/volume when the sides are multiplied by a scale factor? 3. What is the connection between similar shapes and trigonometry? 4. Why do we call sine, cosine and tangent ratios? 5. How can we use trigonometry to solve shape problems? | | **Builds on previous topics:**  - Year 7 work on symmetry  -Pythagoras work from earlier this year | **Links to future topics:**  This work extends to sine and cosine rule as well as 3D Pythagoras and Trigonometry. | |
| **Key knowledge:**   * Enlargement from a point. * Finding the centre of enlargement. * Properties of similarity. * Problem solving with enlargement. * Scale factors and area/volume. * Lines of symmetry and order of rotational symmetry. * Reflections. * Finding the line of reflection. * Rotations around a point. * Describing rotations. * Translating shapes. * Combined transformations. | **Key knowledge continued:**   * Solving equations using fractions. * Measuring lengths of similar right-angled triangles. * Labelling the sides of right-angled triangles. * Using the tangent ratio to find the missing length. * Using sine and cosine ratios to find missing length. * Using the inverse tangent to find angles. * Using sine and cosine to find missing angles. * Solving shape problems. | |
| **Skills developed:**  - Students refine their modelling skills by transforming 2D shapes  -Students extend their skills to finding missing angles and sides of triangles using trigonometry  -Angle notation  -SOHCAHTOA  - | |
| **Mini/Interim assessments:**  Post-tests  **Termly summative assessment:**  Summer assessment. (50%) | | **Independent study tasks/resources:**  KAO, Seneca Learning, Mymaths. | **Key vocabulary 1:** -Similar  -Enlarge  -Area  -Scale Factor  -Volume  -Reflect  -Rotate  -Translate  -Transformations. | **Key vocabulary 2:**  -Hypotenuse  -Adjacent  -Opposite  -Sine  -Cosine  -Tangent  -Theta  -Side  -Angle |
| **Cultural capital opportunities:** … | | **Whole school Curricular Concept links:** - Technological |