

## CURRICULUM PLAN

Department: Mathematics

Vision Statement: Our vision is to place students at the heart of everything we do; empowering them to become confident, independent learners with a lifelong appreciation for mathematics. We strive to create a consistent, positive atmosphere that builds numeracy and problem-solving skills, connects mathematics to real-life applications, and prepares every student for further education, employment, and success in a rapidly evolving world.

Strapline: Fostering Focused, Fluent, Future-Facing Mathematicians

Curriculum Story: The curriculum is a spiral starting in Y7 through to Y13 where the level of difficulty in each topic increases covering Number, Algebra, Geometry, Statistics and Proportion.

Skills developed:

Our KS3–KS5 curriculum empowers students with critical thinking, numeracy fluency, and real-world problem-solving skills. Through consistent challenge and support, learners grow into confident, independent mathematicians ready for academic success and future opportunities.

**Year 7:**

| <u>Topics</u>                       | <u>Why we teach this</u>                                                                                                                                 | <u>Links to last topic</u> | <u>Links to future topics</u> | <u>Key skills developed</u>                                                                                                                                                                           | <u>Cultural capital opportunities</u> | <u>Links to whole school curriculum</u> |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------|
| <b>Autumn 1</b> [                   |                                                                                                                                                          |                            |                               |                                                                                                                                                                                                       |                                       |                                         |
| Unit 2: Number Skills               | To consolidate and extend primary understanding, build fluency and accuracy, and prepare students for more abstract mathematical thinking                | Links through KS2          | Link into KS4                 | Number and Place Value<br>Written and Mental Methods<br>Number Properties and Factors<br>Positive and Negative Numbers<br>Money and Rounding<br>Time and Measurement<br>Reasoning and Problem Solving | Solving real life problems            | Science                                 |
| Unit 1: Analysing & Displaying Data | To help students collect, represent, and interpret information effectively, develop statistical reasoning, and apply mathematics to real-world contexts. | Links through KS2          | Link into KS4                 | Understanding and Using Averages<br>Interpreting and Presenting Data<br>Comparing and Analysing Data<br><br>Working with Graphs                                                                       |                                       | Geography Business                      |

| Autumn 2                                          |                                                                                                                                                                                                                            |                           |               |                                                                                                                                                                     |                      |                                       |
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| Unit 3:<br>Expressions,<br>formulae,<br>functions | To help students move from concrete number work to abstract reasoning, develop confidence with mathematical language and notation, and build the foundational skills needed for algebraic manipulation and problem solving | Links to Number topic     | Link into KS4 | Understanding and Describing Functions<br>Using Symbols and Letters in Algebra<br>Simplifying and Manipulating Algebraic Expressions<br>Substitution and Evaluation | Engineering Industry | DT, Engineering<br><br>Art Technology |
| Unit 4:<br>Decimals &<br>Measures                 | To develop precision, accuracy, and fluency with measurement and decimal concepts. These skills are vital for success across mathematics and in practical, real-world applications.                                        | Links through KS2 and KS3 | Link into KS4 | Measuring and Drawing Accurately<br>Understanding and Converting Units<br>Working with Decimals                                                                     |                      |                                       |
| Spring 1                                          |                                                                                                                                                                                                                            |                           |               |                                                                                                                                                                     |                      |                                       |
| Unit 4:<br>Decimals &<br>Measures                 | To develop precision, accuracy, and fluency with measurement and decimal concepts. These skills are vital for success across mathematics and in practical, real-world applications.                                        | Links through KS2 and KS3 | Link into KS4 | Applying Measurement to Shapes<br>Problem Solving and Estimation                                                                                                    | Finance industry     |                                       |
| Unit 5:<br>Fractions &<br>Percentages             | To build fluency, flexibility, and understanding of proportional relationships, linking number work to real-life contexts and laying strong foundations for ratio, proportion, and algebra in KS3                          | Links through KS2 and KS3 | Link into KS4 | Understanding Fractions<br>Calculating with Fractions<br>Linking Fractions, Decimals, and Percentages                                                               |                      |                                       |

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|                            |                                                                                                                                                                                                                                           |                                        |               | Working with Percentages<br>Applying Understanding                                                                                                           |                                       |                 |
| <b><u>Spring 2</u></b>     |                                                                                                                                                                                                                                           |                                        |               |                                                                                                                                                              |                                       |                 |
| Unit 6: Probability        | to help students understand and describe uncertainty, connect mathematics to real-life situations, and develop reasoning and analytical skills that support data handling, scientific thinking, and decision making in real life problems | Link to analysing Data topic           | Link into KS4 | Understanding Probability Concepts<br>Identifying and Calculating Probabilities<br>Working with Experimental Probability<br>Reasoning and Making Conclusions | Insurance Industry                    |                 |
| Unit 7: Ratio & Proportion | To build strong foundations in proportional reasoning, connect number and algebra, and equip students with practical problem-solving skills for real-life contexts and higher-level mathematics.                                          | Link to unit 5 Fraction and Percentage | Link into KS4 | Understanding Ratio and Proportion<br>Working with Proportion<br>Calculating and Comparing Proportions<br>Solving Ratio Problems                             | Recipes                               | Food Technology |
| <b><u>Summer 1</u></b>     |                                                                                                                                                                                                                                           |                                        |               |                                                                                                                                                              |                                       |                 |
| Unit 8: Lines & Angles     | To develop precision, reasoning, and spatial understanding, helping students connect practical measurement with abstract mathematical ideas.                                                                                              | Links through KS2                      | Link into KS4 | Measuring and Drawing Accurately<br>Understanding and Describing Geometric Properties                                                                        | Construction and Engineering industry | Art Technology  |

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| Unit 9<br>Sequences &<br>Graphs (Book<br>1) | To help students develop<br>abstract thinking, reasoning<br>skills, and the ability to connect<br>different areas of maths                                                | Links through KS2 | Link into KS4 | Applying Angle<br>Facts and Rules<br>Problem Solving with<br>Angles<br><br>Pattern Recognition<br>Rule Application<br>Problem-Solving<br>Algebraic Thinking<br>Coordinate<br>Geometry Skills |                                          | Science, Geography |
| <b>Summer 2</b>                             |                                                                                                                                                                           |                   |               |                                                                                                                                                                                              |                                          |                    |
| Unit 9<br>Sequences &<br>Graphs (Book<br>1) | To help students develop<br>abstract thinking, reasoning<br>skills, and the ability to connect<br>different areas of maths                                                | Links through KS2 | Link into KS4 | Graph Interpretation<br>Analytical Skills                                                                                                                                                    |                                          | Science, Geography |
| Unit 10: Lines<br>& Angles                  | Lines and Angles are used<br>heavily in the construction and<br>design industries. Having a<br>good understanding of shape<br>properties can help solve many<br>problems. | Links through KS2 | Link into KS4 | Shape Recognition<br>and Congruence<br>Transformational<br>Geometry<br>Coordinate<br>Geometry Skills<br>Scale and<br>Enlargement<br>Analytical and<br>Spatial Reasoning                      | Construction and<br>Engineering industry |                    |

| <u>Year 8:</u>                                                          |                                                                                                                                                                                                                                                |                            |                               |                                                                                                                                        |                                       |                                         |
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| <u>Topics</u>                                                           | <u>Why we teach this</u>                                                                                                                                                                                                                       | <u>Links to last topic</u> | <u>Links to future topics</u> | <u>Key skills developed</u>                                                                                                            | <u>Cultural capital opportunities</u> | <u>Links to whole school curriculum</u> |
| <u>Autumn 1</u> [Insert focus of the term here – no more than one line] |                                                                                                                                                                                                                                                |                            |                               |                                                                                                                                        |                                       |                                         |
| Unit 1: Number Skills                                                   | To build a strong foundation in number sense, calculation, and mathematical reasoning. Problem-solving and estimation develop critical thinking, application of skills in real-life contexts, and strategies to check and reason about answers | Links through KS2 and KS3  | Link into KS4                 | Arithmetic and Calculation Skills<br>Number Properties and Factors<br>Powers and Roots<br>Problem-Solving and Estimation               | Solving real life problems            | Art Technology                          |
| Unit 2: Area and volume                                                 | To develop practical measurement and spatial reasoning skills, problem-solving in context                                                                                                                                                      | Links through KS2 and KS3  | Link into KS4                 | Calculation of Area and Volume<br>3D Visualization and Representation<br>Unit Conversion and Measurement<br>Problem-Solving in Context | Construction and Engineering industry |                                         |
| <u>Autumn 2</u>                                                         |                                                                                                                                                                                                                                                |                            |                               |                                                                                                                                        |                                       |                                         |
| Unit 3: Statistics, graphs and charts                                   | To develop skills in interpreting, representing, and analysing data, choosing appropriate methods. These skills prepare students to make solve real-world problems, and                                                                        | Links through KS2 and KS3  | Link into KS4                 | Data Representation<br>Data Analysis<br>Correlation and Trends<br>Critical Thinking                                                    |                                       | Business Geography                      |

|                                         |                                                                                                                                                                                                                                                                                      |                              |               |                                                                                                                                                                       |                                          |                    |
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| Unit 4:<br>Expressions<br>and equations | understand patterns in<br>mathematics and everyday<br>contexts.<br><br>To develop algebraic thinking<br>and problem-solving skills. This<br>builds a foundation for logical<br>reasoning, analytical thinking,<br>and the ability to model real-<br>world situations mathematically, | Links through KS2<br>and KS3 | Link into KS4 | Mathematical<br>Calculations<br><br>Manipulating<br>Algebraic<br>Expressions<br>Understanding<br>Functions<br>Solving Equations<br>Logical and<br>Analytical Thinking |                                          |                    |
| <u>Spring 1</u>                         |                                                                                                                                                                                                                                                                                      |                              |               |                                                                                                                                                                       |                                          |                    |
| Unit 5: Real-<br>life graphs            | To develop skills in constructing,<br>reading, and interpreting<br>graphs.                                                                                                                                                                                                           | Links through KS3            | Link into KS4 | Graph Construction<br>Graph Interpretation<br>Problem-Solving with<br>Graphs<br>Analytical Thinking                                                                   |                                          | Geography, Science |
| Unit 6:<br>Decimals and<br>ratio        | To develop numerical fluency<br>and accuracy. To develop skills<br>in ordering and comparing<br>numbers and applying these<br>concepts to real-world<br>problems.                                                                                                                    | Links through KS2<br>and KS3 | Link into KS4 | Decimal Calculation<br>Rounding and<br>Accuracy<br>Ratio and Proportion<br>Ordering and<br>Comparing<br>Problem-Solving<br>Skills                                     | Finance                                  |                    |
| <u>Spring 2</u>                         |                                                                                                                                                                                                                                                                                      |                              |               |                                                                                                                                                                       |                                          |                    |
| Unit 7: Lines<br>and angles             | To develop spatial reasoning<br>and geometric understanding. S<br>also develop geometric<br>reasoning and proof skills.                                                                                                                                                              | Links through KS2<br>and KS3 | Link into KS4 | Shape Classification<br>and Properties                                                                                                                                | Construction and<br>Engineering Industry | Art Technology     |

|                                          |                                                                                                                                                          |                           |               |                                                                                                                                                                                      |         |                    |
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| Unit 8:<br>Calculating<br>with fractions | To develop numerical fluency and understanding of parts of a whole. To ensure students can manipulate fractions confidently in more complex mathematics. | Links through KS2 and KS3 | Link into KS4 | Angle<br>Understanding and Calculation<br>Geometric Reasoning and Proof<br>Parallel and Intersecting Lines<br><br>Understanding and Comparing Fractions<br>Operations with Fractions | Finance |                    |
| <u>Summer 1</u>                          |                                                                                                                                                          |                           |               |                                                                                                                                                                                      |         |                    |
| Unit 8:<br>Calculating<br>with fractions | To develop numerical fluency and understanding of parts of a whole. To ensure students can manipulate fractions confidently in more complex mathematics. | Links through KS2 and KS3 | Link into KS4 | Reciprocals and Division<br>Problem-Solving Skills                                                                                                                                   | Finance |                    |
| Unit 9:<br>Straight-line<br>graphs       | To develop understanding of proportional relationships and linear functions and apply it to real-world contexts.                                         | Links through KS3         | Link into KS4 | Understanding Proportional Relationships<br>Graph Plotting and Interpretation<br>Gradient and Equation of a Line<br>Problem-Solving Using Graphs                                     |         | Geography, Science |
| <u>Summer 2</u>                          |                                                                                                                                                          |                           |               |                                                                                                                                                                                      |         |                    |



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| Unit 10:<br>Percentages,<br>decimals and<br>fractions | To develop fluency with<br>fractions, decimals, and<br>percentages. To develop skills<br>in problem solving. | Links through KS2<br>and KS3 | Link into KS4 | Equivalence and<br>Conversion<br>Percentage<br>Calculations<br>Application of<br>Decimals<br>Problem-Solving and<br>Reasoning | Finance | Business |
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| <u>Year 9:</u>              |                                                                                                             |                                |                                   |                                                                                                                                                 |                                           |                                             |
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| <u>Topics</u>               | <u>Why we<br/>teach this</u>                                                                                | <u>Links to<br/>last topic</u> | <u>Links to future<br/>topics</u> | <u>Key skills<br/>developed</u>                                                                                                                 | <u>Cultural capital<br/>opportunities</u> | <u>Links to whole<br/>school curriculum</u> |
| <b><u>Autumn 1</u></b>      |                                                                                                             |                                |                                   |                                                                                                                                                 |                                           |                                             |
| Number Skills               | Reasoning and understanding<br>notation to support the solution<br>of increasingly complex<br>problems      | Links through KS2<br>and KS3   | Links into KS4                    | Calculations with all<br>four operations and<br>negative numbers<br>Using index laws<br>surds and standard<br>form Factors<br>multiples HCF LCM | Solving real life<br>problems             | Science                                     |
| Algebra                     | Reinforcing and extending the<br>basics of algebraic<br>manipulation                                        | Links through KS2<br>and KS3   | Links into KS4                    | Simplifying<br>Expanding<br>brackets, factorising<br>solving equations                                                                          |                                           |                                             |
| <b><u>Autumn 2</u></b>      |                                                                                                             |                                |                                   |                                                                                                                                                 |                                           |                                             |
| Graphs Tables<br>and Charts | To allows students time to<br>gather data and information<br>and create their own theories<br>to be tested. | Links through KS2<br>and KS3   | Links into KS4                    | Drawing and<br>interpreting a range<br>of tables and charts                                                                                     | Finance                                   | Business                                    |

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| Fractions ratio and percentage                                                         | Fractions and percentages are among some of the most used maths, from recipes to interest rates.                                                             | Links through KS2 and KS3                                  | Links into KS4                                   | Using operations with percentages and fractions converting between fractions decimals and percentages using ratios                                                                    | Finance                                                         |            |
| <b><u>Spring 1</u></b>                                                                 |                                                                                                                                                              |                                                            |                                                  |                                                                                                                                                                                       |                                                                 |            |
| Equations and Expressions or<br><br>Angles<br>Pythagoras and right angled trigonometry | Reinforcing and extending the basics of algebraic manipulation<br><br>To enable pupil to solve problems in a real-world context using right-angled triangles | Links through KS2 and KS3<br><br>Links through KS2 and KS3 | Links into KS4 & KS5<br><br>Links into KS4 & KS5 | Solving different types of equations and inequalities using sequences<br><br>Solving problems with parallel lines and polygons using Pythagoras and trigonometry with right triangles | Construction and Engineering industry                           | Technology |
| <b><u>Spring 2</u></b>                                                                 |                                                                                                                                                              |                                                            |                                                  |                                                                                                                                                                                       |                                                                 |            |
| Angles<br><br>Averages                                                                 | To help students understand the world around them<br><br>Data processing and statistics are one of the most used branches of mathematics.                    | Links through KS2 and KS3                                  | Links into KS4                                   | Properties of shapes angles in parallel lines and triangles angles in polygons<br><br>Find mean mode median and range from lists and tables Interpret and use averages                | Construction and Engineering Industry<br><br>Insurance Industry |            |

|                                                                         |                                                                                             |                           |                      |                                                                                                                                                                         |                                       |            |
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| Graphs                                                                  | Co-ordinates and graphs form the basis for the analysis of the equation of a straight line. | Links through KS3         | Links into KS4 & KS5 | Plot draw and interpret linear non linear graphs Draw and Interpret real life graphs                                                                                    |                                       | Geography  |
| <b>Summer 1</b> [Insert focus of the term here – no more than one line] |                                                                                             |                           |                      |                                                                                                                                                                         |                                       |            |
| Area and Volume                                                         | Builds an understanding of shape and space.                                                 | Links through KS2 and KS3 | Links into KS4       | Area of polygons<br>Surface area and volume of 3D shapes<br>Convert between different units Area and circumference of circles and sectors<br>Error intervals and bounds | Construction and Engineering industry | Technology |
| Transformations and constructions                                       | Builds on earlier understanding of 2d shapes.                                               | Links through KS2 and KS3 | Links into KS4       | Transform 2D shapes by reflection translation rotation and enlargement<br>Draw plans and elevations of 3d shapes and construct 2d shapes and loci                       |                                       | Art        |
| <b>Summer 2</b>                                                         |                                                                                             |                           |                      |                                                                                                                                                                         |                                       |            |
| Graphs                                                                  | Co-ordinates and graphs form the basis for the analysis of the equation of a straight line. | Links through KS3         | Links into KS4       | Plot draw and interpret linear non linear graphs Draw and Interpret real life graphs                                                                                    |                                       |            |

|                            |                                                                     |                           |                      |                                                                                                                                      |                    |     |
|----------------------------|---------------------------------------------------------------------|---------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----|
| Transformations            | Builds on earlier understanding of 2d shapes.                       | Links through KS2 and KS3 | Links into KS4       | Transform 2D shapes by reflection translation rotation and enlargement                                                               | Insurance Industry | Art |
| Equations and inequalities | To enable students to solve equations and inequalities              | Links through KS2 and KS3 | Links into KS4 & KS5 | Solve complex inequalities Solve quadratics by factorising completing the square and using the formulae solve simultaneous equations |                    |     |
| Probability                | Measure how likely something is to happen so risk can be calculated | Links through KS3         | Links into KS4 & KS5 | Find probabilities using tables and diagrams Understand mutually exclusive events                                                    |                    |     |

**Year 10:**

| <u>Topics</u>                                                           | <u>Why we teach this</u>                                                                      | <u>Links to last topic</u> | <u>Links to future topics</u> | <u>Key skills developed</u>                                                                                                          | <u>Cultural capital opportunities</u> | <u>Links to whole school curriculum</u> |
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| <b>Autumn 1</b> [Insert focus of the term here – no more than one line] |                                                                                               |                            |                               |                                                                                                                                      |                                       |                                         |
| Equations and inequalities                                              | To enable students to solve equations and inequalities                                        | Links through KS2 and KS3  | Links into KS5                | Solve complex inequalities Solve quadratics by factorising completing the square and using the formulae solve simultaneous equations |                                       |                                         |
| Probability                                                             | Measure how likely something is to happen so risk can be calculated                           | Links through KS3          | Links into KS5                | Find probabilities using tables and diagrams Understand mutually exclusive events                                                    | Insurance industry                    |                                         |
| Ratio                                                                   | Reasoning and understanding notation to support the solution of increasingly complex problems | Links through KS2 and KS3  |                               | Simplify ratios divide in a ratio solve simple direct and indirect proportion problems                                               | Food Technology / recipes             |                                         |
| Transformations                                                         | Builds on earlier understanding of 2d shapes.                                                 | Links through KS2 and KS3  |                               | Transform 2D shapes by reflection translation rotation and enlargement                                                               |                                       | Art                                     |

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| <b><u>Autumn 2</u></b> |
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|                          |                                                                                                                                                                                                                      |                           |                |                                                                                                                                            |                                                    |            |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------|
| Probability              | Measure how likely something is to happen so risk can be calculated                                                                                                                                                  | Links through KS3         | Links into KS5 | Find probabilities using tables and diagrams Understand mutually exclusive events                                                          | Insurance                                          |            |
| Multiplicative reasoning | Use of mathematics within a financial context is essential for life beyond school.                                                                                                                                   | Links through KS2 and KS3 |                | Working with Percentages Compound measures and proportion                                                                                  | Finance                                            |            |
| Further statistics       | To give the skills to collect, display and interpret data.                                                                                                                                                           | Links through KS2 and KS3 | Links into KS5 | Working with more advanced charts Cumulative frequency box plots and histograms                                                            | Finance and data industries                        |            |
| Equations and graphs     | Develop knowledge of non-linear graphs, looking at quadratic, cubic and reciprocal graphs so they recognise different shapes. Graphically, we look at finding the roots of quadratics and revisit algebraic methods. | Links through KS3         | Links into KS5 | Solving simultaneous equations inequalities and quadratics using graphs Solving equations using iterative processes Expand triple brackets |                                                    |            |
| <b><u>Spring 2</u></b>   |                                                                                                                                                                                                                      |                           |                |                                                                                                                                            |                                                    |            |
| Construction             | Builds on earlier understanding of 2d shapes.                                                                                                                                                                        | Links through KS2 and KS3 |                | Draw plans and elevations of 3d shapes and construct 2d shapes and loci                                                                    | Architecture Engineering and construction industry | Technology |

|                  |                                                                                                                                                                                                                                     |                           |                |                                                                          |  |         |
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| Circle Theorem   |                                                                                                                                                                                                                                     | Links through KS2 and KS3 | Links into KS5 | Solve problems using circle theorem                                      |  |         |
| Algebra Advanced | Build on study of changing he subject. Reviews solving equations and inequalities before moving on to rearrangement of both familiar and unfamiliar formulae. Higher tier students are introduced to solving equations by iteration | Links through KS3         | Links into KS5 | Rearranging complex formulae Algebraic fractions Proof and complex surds |  | Science |
|                  |                                                                                                                                                                                                                                     |                           |                |                                                                          |  |         |

### **Summer 1**

|                                |                                                                                                                                                                                                                      |                           |                |                                                                                                                      |                              |                |
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| Quadratic equations and graphs | Develop knowledge of non-linear graphs, looking at quadratic, cubic and reciprocal graphs so they recognise different shapes. Graphically, we look at finding the roots of quadratics and revisit algebraic methods. | Links through KS3         | Links into KS5 | Expand solve and factorise quadratics algebraically<br>Use quadratic graphs to find roots and turning points         |                              |                |
| Perimeter and area             | Develop skills in geometric proof                                                                                                                                                                                    | Links through KS2 and KS3 | Links into KS5 | Area and circumference of circles and sectors<br>Error intervals<br>Solving problems with 2D and 3D composite shapes | Construction and engineering | Art Technology |



|                       |                                                                                              |                           |                |                                                                                                   |  |         |
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| Vectors and proof     | Make links to prior knowledge of properties of shape and parallel lines                      | Links through KS3         | Links into KS5 | To solve geometric problems                                                                       |  | Science |
| Proportion and graphs | Real life graphs are studied, including speed/distance/time construction and interpretation. | Links through KS2 and KS3 |                | To be able to solve proportion problems algebraically<br>To be able to link graphs and proportion |  |         |

## **Summer 2**

|                                   |                                                                                                                  |                           |                |                                                                                 |  |         |
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| Fractions and indices             | Recognise square and cube numbers. Calculation of indices with any number as the power and to use standard form. | Links through KS2 and KS3 | Links into KS5 | Calculate with mixed numbers<br>To write and calculate numbers in standard Form |  | Science |
| Revise and prepare for mock exams |                                                                                                                  |                           |                | A range of topics from the last year<br>Interleaved papers                      |  |         |
| Feedback from mock exams          |                                                                                                                  |                           |                | Lessons based upon outcomes from mock exam                                      |  |         |

**Year 11:**

| <u>Topics</u> | <u>Why we teach this</u> | <u>Links to last topic</u> | <u>Links to future topics</u> | <u>Key skills developed</u> | <u>Cultural capital opportunities</u> | <u>Links to whole school curriculum</u> |
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## Autumn 1

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| Equations and inequalities | To enable students to solve equations and inequalities                                        | Links through KS2 and KS3 | Links into KS5 | Solve complex inequalities<br>Solve quadratics by factorising<br>completing the square and using the formulae<br>solve simultaneous equations |                    |                 |
| Probability                | Measure how likely something is to happen so risk can be calculated                           | Links through KS3         | Links into KS5 | Find probabilities using tables and diagrams<br>Understand mutually exclusive events                                                          | Insurance industry |                 |
| Ratio                      | Reasoning and understanding notation to support the solution of increasingly complex problems | Links through KS3         |                | Simplify ratios<br>divide in a ratio<br>solve simple direct and indirect proportion problems                                                  | Cooking / recipes  | Food Technology |

## Autumn 2

|                          |                                                                                                                  |                           |                |                                                                                                                      |                                  |                            |
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| Multiplicative Reasoning | Use of mathematics within a financial context is essential for life beyond school.                               | Links through KS2 and KS3 |                | Working with Percentages<br>Compound measures and proportion                                                         | Finance                          | Business and Science       |
| Further statistics       | To give the skills to collect, display and interpret data.                                                       | Links through KS2 and KS3 | Links into KS5 | Working with more advanced charts<br>Cumulative frequency box plots and histograms                                   | Finance and marketing industries | Business science geography |
| Perimeter and area       | Develop skills in geometric proof                                                                                | Links through KS2 and KS3 | Links into KS5 | Area and circumference of circles and sectors<br>Error intervals<br>Solving problems with 2D and 3D composite shapes | Construction and engineering     | Art Technology             |
| Fractions and indices    | Recognise square and cube numbers. Calculation of indices with any number as the power and to use standard form. | Links through KS2 and KS3 | Links into KS5 | Calculate with mixed numbers<br>To write and calculate numbers in standard Form                                      |                                  | Science                    |

**Spring 1**

|                      |                                                                                                                                                                                                                      |                           |                |                                                                                                                                                     |  |  |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| Transformations      | Builds on earlier understanding of 2d shapes.                                                                                                                                                                        | Links through KS2 and KS3 |                | Transform 2D shapes by reflection translation rotation and enlargement<br>Draw plans and elevations of 3d shapes and construct 2d shapes and loci   |  |  |
| Equations and graphs | Develop knowledge of non-linear graphs, looking at quadratic, cubic and reciprocal graphs so they recognise different shapes. Graphically, we look at finding the roots of quadratics and revisit algebraic methods. | Links through KS2 and KS3 | Links into KS5 | Solving simultaneous equations<br>inequalities and quadratics using graphs<br>Solving equations using iterative processes<br>Expand triple brackets |  |  |

| <b><u>Spring 2</u></b>        |  |  |  |  |  |  |
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| Bespoke based upon mock exams |  |  |  |  |  |  |
| <b><u>Summer 1</u></b>        |  |  |  |  |  |  |
| Bespoke based upon mock exams |  |  |  |  |  |  |
| <b><u>Summer 2</u></b>        |  |  |  |  |  |  |
| <b>N/a</b>                    |  |  |  |  |  |  |

## Year 12 A-Level Mathematics

| Term            | Topics                                                                                     | Why we teach this                                                                                             | Links to last topic                                                  | Links to future topics                                                                                       | Key skills developed                                                                                            | Cultural capital opportunities                                                              | Links to whole school curriculum                                                    |
|-----------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Autumn 1</b> | <b>Algebra &amp; Functions</b><br>(quadratics, factor theorem, functions, transformations) | Algebra is foundational for all areas of mathematics; functions underpin calculus, mechanics, and statistics. | Builds on GCSE algebra: solving equations, manipulating expressions. | Essential for differentiation, integration, and solving equations in Mechanics and Statistics.               | Manipulating expressions, solving complex equations, understanding function behavior, graphical interpretation. | Real-world modelling workshops, coding with functions in Python or Excel to solve problems. | Logical reasoning and problem-solving transferable to sciences and computing.       |
|                 | <b>Coordinate Geometry</b> (lines, circles, intersections)                                 | Introduces methods for analysing geometric relationships algebraically.                                       | Builds on GCSE coordinate geometry.                                  | Leads into calculus (gradients, tangents) and Mechanics (motion along a line, forces).                       | Analytical geometry, proof techniques, problem-solving with algebra and graphs.                                 | Use of dynamic geometry software (Desmos, GeoGebra) for visualisation.                      | Links to physics (vectors, trajectories), computer science (graphics), engineering. |
|                 | <b>Sequences &amp; Series</b> (arithmetic, geometric, sigma notation)                      | Key tool for modelling growth, patterns, and sums in real-world contexts.                                     | Builds on GCSE sequences and series.                                 | Prepares for calculus (limits, summation of series, convergence) and Statistics (probability distributions). | Pattern recognition, summation, derivation of formulas, mathematical proof.                                     | Applications in finance (compound interest), biology (population growth), economics.        | Links to numeracy, computing, and economics (modelling real-world trends).          |

|                 |                                                                                    |                                                                                        |                                                        |                                                                                                            |                                                                                                         |                                                                                         |                                                                                      |
|-----------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>Autumn 2</b> | <b>Differentiation</b><br>(basic rules, tangents, stationary points, optimization) | Introduces rates of change, which are essential in calculus, physics, and engineering. | Builds on algebra, functions, and coordinate geometry. | Prepares for integration and Mechanics (velocity, acceleration, motion problems).                          | Calculus techniques, problem-solving, graphical interpretation, real-world modelling.                   | Practical examples: motion, growth/decay, optimisation problems in industry and nature. | Links to physics (kinematics), economics (max/min problems), computing (simulation). |
|                 | <b>Integration</b><br>(indefinite, definite, area under curve)                     | Provides tools to calculate accumulations, areas, and totals from rates of change.     | Builds on differentiation.                             | Leads to Mechanics (displacement from velocity) and Statistics (area under probability density functions). | Calculus techniques, algebraic manipulation, numerical approximation, problem-solving.                  | Modelling real-world processes, e.g., population growth, work done in physics.          | Links to science, economics, engineering, and data interpretation.                   |
| <b>Spring 1</b> | <b>Vectors in 2D &amp; 3D</b>                                                      | Provides spatial reasoning skills; essential for mechanics and physics.                | Builds on coordinate geometry and algebra.             | Leads into Mechanics (forces, motion along lines, equilibrium).                                            | Vector algebra, magnitude/direction calculations, scalar and vector products, geometric interpretation. | Engineering/architecture examples, computer graphics, navigation.                       | Links to physics, computing, and engineering.                                        |
|                 | <b>Mechanics – Kinematics (M1)</b>                                                 | Applies mathematics to motion problems: displacement, velocity, acceleration.          | Builds on differentiation and vectors.                 | Leads to dynamics (forces) in Mechanics M1.                                                                | Modelling motion, calculus application, problem-solving, interpreting graphs.                           | Simulations of motion, real-world physics applications (sports, vehicles).              | Links to physics, engineering, sports science.                                       |

|                 |                                                              |                                                                            |                                             |                                                                                |                                                                                                  |                                                                    |                                                                              |
|-----------------|--------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------------------------------|
| <b>Spring 2</b> | <b>Mechanics – Forces &amp; Newton’s Laws (M1)</b>           | Introduces forces, equilibrium, and Newton’s laws in mathematical form.    | Builds on vectors and kinematics.           | Leads to further Mechanics problems in Year 13 (energy, circular motion).      | Analytical problem-solving, vector resolution, applying calculus in dynamics.                    | Physics experiments: pulleys, projectiles, engineering structures. | Links to physics, engineering, robotics.                                     |
|                 | <b>Statistics – Probability &amp; Distributions (S1)</b>     | Fundamental for modelling uncertainty and data analysis.                   | Builds on sequences, series, and functions. | Leads to hypothesis testing, statistical inference, and S2 content in Year 13. | Probability calculations, combinatorics, expected value, variance, modelling with distributions. | Applications in finance, AI, epidemiology, risk assessment.        | Links to science, economics, computing, social sciences.                     |
| <b>Summer 1</b> | <b>Statistics – Binomial &amp; Normal Distributions (S1)</b> | Introduces discrete and continuous probability models for real-world data. | Builds on probability foundations.          | Prepares for inferential statistics in Year 13.                                | Calculating probabilities, using formulae and tables, applying approximation techniques.         | Real-world modelling: polling data, quality control, genetics.     | Links to biology, economics, psychology, and social sciences.                |
|                 | <b>Revision &amp; Problem Solving</b>                        | Consolidates knowledge from Autumn and Spring terms; develops exam skills. | All previous topics.                        | Essential foundation for Year 13 A-Level Maths.                                | Exam techniques, multi-step problem-solving, logical reasoning, proof writing.                   | Participation in maths competitions, enrichment challenges.        | Cross-curricular numeracy, logical reasoning, resilience, critical thinking. |

**Summer 2**     **Applied Problem Solving /**     Encourages application of mathematical     Builds on all prior topics.     Bridges Year 12 to Year 13



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**Enrichment  
Projects**

knowledge to  
complex real-  
world contexts.

advanced  
content.

**Year 13**

| Term            | Topics                                                                                              | Why we teach this                                                               | Links to last topic                                  | Links to future topics                             | Key skills developed                                                                    | Cultural capital opportunities                           | Links to whole school curriculum                       |
|-----------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------|
| <b>Autumn 1</b> | <b>Algebra &amp; Functions – Advanced</b><br>(polynomials, partial fractions, parametric equations) | Builds deeper understanding of functions, essential for calculus and mechanics. | Builds on Year 12 algebra, sequences, and functions. | Leads into C3 calculus and differential equations. | Manipulating complex expressions, solving higher-degree equations, parametric graphing. | Mathematical modelling competitions, coding simulations. | Develops logical reasoning, problem-solving, numeracy. |
|                 | <b>C3 – Differentiation &amp; Integration</b><br>(advanced techniques, chain,                       | Extends calculus skills for complex applications in                             | Builds on Year 12 differentiation and integration.   | Leads into C4 topics, M2 (forces, energy), and S2  | Advanced calculus, solving applied problems,                                            | Real-world physics applications,                         | Links to physics, engineering, economics.              |

|                 |                                                                                                                      |                                                                        |                                                                |                                                          |                                                                                    |                                                                      |                                                    |
|-----------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------|
|                 | product, quotient, integration by parts)                                                                             | mechanics and statistics.                                              |                                                                | (continuous distributions).                              | optimisation, approximation.                                                       | financial modelling.                                                 |                                                    |
|                 | <b>Vectors in 3D &amp; Geometry</b>                                                                                  | Provides spatial reasoning for 3D mechanics.                           | Builds on Year 12 vectors.                                     | Leads into M2 mechanics (forces, circular motion).       | Vector algebra, 3D geometric visualization, scalar and vector products.            | Engineering, architecture, computer graphics.                        | Links to physics, engineering, design, computing.  |
| <b>Autumn 2</b> | <b>C3 – Further Calculus &amp; Differential Equations</b>                                                            | Solve differential equations, model real-world rates of change.        | Builds on C3 calculus and Year 12 differentiation/integration. | Leads to C4 and applied mechanics M2.                    | Modelling, calculus, problem-solving, analytical reasoning.                        | Real-world physics and biology modelling (population growth, decay). | Links to physics, biology, economics, engineering. |
|                 | <b>Statistics – S2 Foundations</b> (correlation, regression, hypothesis testing basics)                              | Introduces statistical modelling and inference for real-world data.    | Builds on S1 probability and distributions.                    | Leads to full S2 hypothesis testing and estimation.      | Data analysis, interpretation, probability calculations, critical reasoning.       | Real-life data projects, surveys, data science examples.             | Links to science, economics, social sciences.      |
| <b>Spring 1</b> | <b>C4 – Advanced Calculus &amp; Algebra</b> (complex numbers, roots of polynomials, advanced integration techniques) | Deepens problem-solving skills and prepares for complex applied maths. | Builds on C3 differentiation/integration and algebra.          | Leads to applied mechanics M2 and problem-solving tasks. | Complex number manipulation, advanced integration, solving higher-order equations. | Applied engineering challenges, STEM problem-solving competitions.   | Links to computing, physics, engineering.          |

|                 |                                                                                                      |                                                                             |                                                        |                                                               |                                                                                           |                                                                             |                                                           |
|-----------------|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------|
|                 | <b>M2 – Momentum, Work, Energy, Circular Motion</b>                                                  | Applies calculus and vectors to mechanics problems in real-world contexts.  | Builds on Year 12 M1 (forces, kinematics) and vectors. | Leads to further dynamics and optional modules (Year 13).     | Modelling, analytical problem-solving, vector resolution, calculus applications.          | Physics lab experiments, sports mechanics, engineering applications.        | Links to physics, engineering, sports science.            |
| <b>Spring 2</b> | <b>Statistics – S2 Hypothesis Testing &amp; Probability</b>                                          | Enables students to make inferences and predictions based on data.          | Builds on S2 foundations and S1 distributions.         | Leads to applied data analysis projects and Year 13 exams.    | Hypothesis testing, statistical inference, probability calculations, regression analysis. | Data modelling, finance, epidemiology, AI examples.                         | Links to biology, economics, social sciences, computing.  |
|                 | <b>Revision &amp; Problem Solving</b>                                                                | Consolidates Year 13 content, exam preparation.                             | Builds on all prior topics.                            | Prepares for final A-Level exams.                             | Multi-step problem-solving, exam techniques, proof writing, modelling.                    | Maths competitions, enrichment, STEM challenges.                            | Cross-curricular numeracy, logical reasoning, resilience. |
| <b>Summer 1</b> | <b>Applied Project / Enrichment</b>                                                                  | Apply mathematical knowledge to real-world scenarios, independent research. | Builds on all Year 13 topics.                          | Bridges to university-level maths and applied STEM studies.   | Modelling, teamwork, independent research, communication.                                 | STEM competitions, real-world projects, coding simulations, industry links. | Links to STEM subjects, economics, computing, leadership. |
| <b>Summer 2</b> | <b>Further Problem Solving &amp; Extension Topics</b><br>(optional, e.g., matrices, further vectors) | Stretch and challenge students, prepare for university courses.             | Builds on C4, M2, S2 knowledge.                        | Leads to preparation for undergraduate maths and engineering. | Problem-solving, critical thinking, independent exploration.                              | Competitions, enrichment programs, STEM fairs.                              | Links to physics, computing, engineering, economics.      |

## **Appendix A: Whole-school Curriculum Vision**

### **OUR CURRICULUM VISION**

Colton Hills Community School is an inner-city school with a diverse cohort that draws from a wide range of cultures, nationalities and identities. A significant majority of our students come from working class backgrounds, and many from households where resources can be scarce and access to cultural capital is limited. Our school proudly holds the status of a School of Sanctuary, where students from across the local area – and across the globe, too – can come together to learn harmoniously regardless of their background and upbringing. We are aware of the challenges of our students' lives, but do not use them as an excuse.

Therefore, the intention of our curriculum is that we will offer our students the access to a broad and varied curriculum that seeks to equip them for modern life. We intend it to be knowledge-rich, deep in its explorations of topics, challenging in its delivery and with a distinctive, outward-looking, international feel. We recognised the importance of grounding our curriculum in its wider contexts to enable us to fill gaps in our students' knowledge that they may have when compared to students from more affluent backgrounds, and we are unapologetic in ensuring that our students have every opportunity to engage with as much powerful knowledge as those more fortunate than they are.

With these school contexts in mind, at Colton Hills we have built our curriculum around a series of thematically based Curricular Concepts that students will see in various subjects, enabling them to draw links and supporting them in making connections that might not always be apparent to them.

The intention of our curriculum at all stages is that we will teach all children at the school that:

- 1 – Humanity is on an optimistic, positive journey of developing tolerance, enfranchisement and rights for all peoples, and we must all play our part in this (SOCIAL JUSTICE)**
- 2 – Diversity is a gift to be valued, one that enriches our school, and that the shared histories of all cultures are worthy of respect and understanding (CULTURAL DIVERSITY)**
- 3 – Respect for the law, democracy and its institutions are vital, but that existing power structures should always be respectfully questioned (CIVIC RESPONSIBILITY)**
- 4 – Technological development is full of great human achievement, but is not without its challenges and drawbacks of which we must always be aware (TECHNOLOGICAL PROGRESS)**
- 5 – The natural world is a place of wonder, mystery and beauty that should be respected, revered and protected, particularly in the face of climate change (PRECIOUS PLANET)**
- 6 – Our health – mentally, physically and spiritually – is of primary importance and must be preserved as it contributes immensely to a happy and productive life (HEALTHY LIVING)**
- 7 – Being enterprising and financially independent is crucial, but making money should always be weighed against the moral decisions about who it might affect (ETHICAL ENTERPRISE)**

**8 – An appreciation of the vast array of creative arts and their power to entertain and educate is vital in an enriched, meaningful and fulfilled life (ARTISTIC CREATIVITY)**

Students who leave school with wider awareness of the world around them, with self-respect and with a personal morality will be best able to take advantage of all that life offers, and find their place in the world as a citizen of all of their communities.