Caroline Chisholm School
Ambition Confidence Success
Everyone Every Lesson Every Opportunity

# Year 11 Foundation Mathematics Curriculum

| Unit | Core knowledge/skill development | Sequence | Assessment | Literacy, numeracy, PSHE, FBV, other links | ACP and VAA development | Home learning and enrichment |
|---|---|---|---|---|---|---|
| DIRECT & INVERSE PROPORTION: (2 weeks) | **Fluency and reasoning skills:** National Curriculum content covered includes: understand that X is inversely proportional to Y is equivalent to X is proportional to 1/Y {construct and} interpret equations that describe direct and inverse proportion. extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically. | Students develop their multiplicative reasoning in a variety of contexts, from simple scale factors through to complex equations involving direct and inverse proportion. They link inverse proportion with the formulae for pressure and density. There is also the opportunity to review ratio problems. Students should be exposed to different representations such as word problems, graphs and equations. | End of unit assessment | Key words:<br>Direct proportion<br>Equation<br>Origin<br>Constant ratio<br>Straight line<br>Linear<br>Constant of proportionality<br>Varies directly |  <br>**Precision**: The ability to work effectively within the rules of the domain. **Complex and multi-step problem Solving:** The ability to break down a task, decide on a suitable approach, and then act.<br>  <br>**Agile learners;** Working with an enquiring mind. | Mathswatch lesson and homework tasks: |

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| AREA & VOLUME: (3 weeks) | **Fluency and reasoning skills:** Derive and apply formulae to calculate and solve problems involving: Perimeter and area of triangles, parallelograms, trapezia, volume of cuboids and other prisms (including cylinders) Know the formulae: circumference of a circle = 2πr = πd, area of a circle = πr2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids Extend and formalise knowledge of ratio | This block builds on KS3 & year 10 work on ratio and fractions, highlighting similarities and differences and links to other areas of mathematics including both algebra and geometry. The focus is on reasoning and understanding notation to support the solution of increasingly complex problems that include information presented in a variety of forms. | End of unit assessment | Area Perpendicular height Units Formulae Compound Dimensions |  **Connection Finding**: The ability to use connections from the past experiences to seek possible generalisations.  **Complex and multi-step problem solving:** The ability to break down a task, decide on a suitable approach, and then act.  **Agile learners;** Working with an enquiring mind. | Mathswatch lesson and homework tasks: |

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| | and proportion, including trigonometric ratios.<br>Apply the concepts of congruence and similarity, including the relationships between lengths, {areas and volumes} in similar figures.<br>Apply Pythagoras' Theorem and trigonometric ratios to find angles and lengths in right-angled triangles in two dimensional figures<br>know the exact values of sin $\theta$, cos $\theta$, tan $\theta$ for required angles. | | | | | |
| BASIC NUMBER<br>(1 week) | **Fluency and reasoning skills:**<br>National Curriculum content covered includes:<br>• use the four operations, including | This block again mainly revises KS3 content, reviewing integers, decimals and fractions and all associated number content. Students | End of unit assessment | Fraction<br>Numerator<br>Denominator<br>Reciprocal Mixed number<br>Improper fraction |  <br>**Complex and multi-step problem solving:** | Mathswatch lesson and homework tasks: |

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| | formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative<br>• work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 2 7 or 0.375 and 3/8)<br>• convert between fractions, decimals and percentages using place value<br>• compare the value of fractions, decimals and percentages | will develop their knowledge of the number system to include rational and real numbers. The block provides plenty of opportunity for students to revisit and practise their number skills both with and without a calculator as necessary. | | Integer Decimal Terminating Recurring Infinite Root | The ability to break down a task, decide on a suitable approach, and then act.<br>  <br>Agile learners; Working with an enquiring mind. | |
| COLLECTING & REPRESENTING DATA:<br>(2 weeks) | Fluency and reasoning skills:<br>• consolidating subject content from key stage 3: | This block builds on KS3 work on the collection, representation and use of summary statistics to describe | End of unit assessment | Primary Secondary Source Data Questionnaire Experiment |  <br>Meta-cognition: The ability to knowingly use a wide range of thinking | Mathswatch lesson and homework tasks: |

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| | use describe, interpret and compare observed distributions of a single variable through appropriate graphical representation involving discrete, continuous and grouped data construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data. describe, interpret and compare observed distributions of a single variable through appropriate | data. Much of the content is familiar, both from previous study within and beyond mathematics (including Geography and Science) and from everyday life. The steps have been chosen to balance consolidation of existing knowledge with extending and deepening, particularly in terms of interpretation of results and evaluating and criticising statistical methods and diagrams. Again the emphasis with these topics should be on interpretation (particularly in | | Frequency polygon Midpoint Endpoint Frequency Class Interval Line/Bar chart Frequency Dual/Multiple Composite Angle Sector Radius Subtend | approaches and to transfer knowledge from one circumstance to another.<br><br>Strategy planning: The ability to approach new learning experiences by actively attempting to connect it to existing knowledge or concepts and hence determine an appropriate way to think about the work.<br><br>  <br><br>Critical or logical thinking:<br>The ability to deduct, hypothesise, reason, seek supporting evidence.<br><br>  <br><br>Agile learners; | |

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| | graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers)<br>• infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling<br>• interpret and construct tables and line graphs for time series data<br>• interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate | making comparisons) and not just construction. A possible approach to teaching this unit would be project-based, where students collect primary data (or select samples from secondary data) from which they make and test hypotheses, thus giving a purpose to the creation and analysis of the diagrams and measures involved. | | | Working with an enquiring mind. | |

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| | graphical representation involving discrete, continuous and grouped data<br>• apply statistics to describe a population<br>• interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (including modal class) and spread | | | | | |
| LINEAR GRAPHS: (1 week) | **Fluency and reasoning skills:**<br>• Develop algebraic and graphical fluency, including understanding linear functions.<br>• Recognise, sketch and produce | This block builds on earlier study of straight-line graphs in years 9 and 10. Students plot straight lines from a given equation, and find and interpret the equation of a straight line from a | End of unit assessment | Parallel<br>Horizontal<br>Vertical<br>Straight line<br>Axis<br>Equation<br>Graph<br>Intercept<br>Linear<br>Table of Values |  <br>**Precision:**<br>The ability to work effectively within the rules of the domain.<br>**Complex and multi-step problem solving:** | Mathswatch lesson and homework tasks: |

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| | graphs of linear functions with appropriate scaling, using equations in x and y and the cartesian plane<br>• Interpret mathematical relationships both algebraically and graphically<br>• Reduce a given linear equation in two variables to the standard form y = mx + c,<br>• Calculate and interpret gradients and intecepts of graphs of such linear equations, numerically, graphically and algebraically | variety of situations and given information. | | Gradient | The ability to break down a task, decide on a suitable approach, and then act.<br>  <br>Agile learners;<br>Working with an enquiring mind. | |

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| Standard Form<br><br>(1 week) | **Fluency and reasoning skills:**<br><br>interpret and compare numbers in standard form $A \times 10^n$ , $1 \leq n < 10$ where $n$ is a positive or negative integer or zero<br>• know, use and understand the term standard from<br>• write an ordinary number in standard form<br>• write a number written in standard form as an ordinary number<br>• order and calculate with numbers written in standard form<br>• solve simple equations where the numbers are written in standard form | This block consolidates their understanding of standard form and focuses on powers generally, in particular in standard form. Students will revisit their knowledge of the number system. This work provides plenty of opportunity for students to revisit and practise their skills using standard form. | End of unit assessment | Standard form<br>Power<br>Index/Indices<br>Exponent<br>Million/Billion |  <br>**Meta-cognition:**<br>**Precision:**<br>The ability to work effectively within the rules of the domain.<br><br>**Strategy planning:** The ability to approach new learning experiences by actively attempting to connect it to existing knowledge or concepts and hence determine an appropriate way to think about the work.<br>  <br>**Agile learners;**<br>Working with an enquiring mind. | Mathswatch lesson and homework tasks: |

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| | • interpret calculator displays<br>• use a calculator effectively for standard form calculations<br>• solve standard form problems with and without a calculator | | | | | |
| Revision of Notation (2 weeks) | **Fluency and reasoning skills:**<br><br>•understand the standard conventions for equal sides and equal sides and parallel lines and diagrams<br>•distinguish between acute, obtuse, reflex and right angles<br>•name angles<br>•use one lower-case letter or three upper-case letters to represent an angle, for example x or ABC | This block builds on KS3 understanding of angle notation and relationships, extending all students to knowledge. | End of unit assessment | Angle<br>Adjacent<br>Vertically<br>Opposite<br>Point<br>Straight line<br>Parallel<br>Corresponding<br>Alternate<br>Co-interior<br>Interior<br>Exterior |  <br>**Meta-cognition:** The ability to knowingly use a wide range of thinking approaches and to transfer knowledge from one circumstance to another.<br>  <br>**Connection finding:** The ability to use connections from the past experiences to seek possible generalisations. | Mathswatch lesson and homework tasks: |

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| | •understand and draw lines that are parallel<br>•understand that two lines that are perpendicular are at $90^0$ to each other<br>•identify lines that are perpendicular<br>•draw a perpendicular line in a diagram<br>•use geometrical language •use letters to identify points and lines<br>•recognise that, for example, in a rectangle ABCD the points A, B, C and D go around in order | | | |  <br>Agile learners;<br>Working with an enquiring mind. | |

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| CONSTRUCTIONS & LOCI (2 weeks) | **Fluency and reasoning skills:**<br><br>Use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle)<br>use these to construct given figures and solve loci problems.<br>know that the perpendicular distance from a point to a line is the shortest distance to the line | This block builds on and revisits the constructions studied in KS3 to formally look at the idea of a locus and the standard constructions using a straight edge and a pair of compasses. This is a very practical unit, and it is useful to explore loci in real life as well. | End of unit assessment | Locus<br>Path<br>Equidistant<br>Construction lines<br>Point<br>Arc<br>Perpendicular Bisector |  <br>**Meta-cognition:**<br>The ability to work effectively within the rules of the domain.<br><br>  <br>**Connection finding:**<br>The ability to use connections from the past experiences to seek possible generalisations.<br>  <br>**Agile learners;**<br>Working with an enquiring mind. | Mathswatch lesson and homework tasks: |
| ANGLE PROPERTIES: (2 weeks) | **Fluency and reasoning skills:** | This block provides a great opportunity for students to consolidate their | End of unit assessment | Angle<br>Adjacent<br>Vertically Opposite |  <br>**Meta-cognition:** The ability to knowingly use a | Mathswatch lesson and homework tasks: |

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| | Apply the properties of angles at a point, angles at a point angles on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines. derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon and to derive properties of regular polygons) | knowledge of angles facts and develop increasingly complex chains of reasoning to solve geometric problems. They revisit other materials and make links across the mathematics curriculum. Students will also reinforce their understanding of trigonometry and Pythagoras from earlier this year, applying their skills in another context as well as using mathematics to model real-life situations | | Point<br>Straight line<br>Parallel<br>Corresponding<br>Alternate<br>Co-interior<br>Interior<br>Exterior | wide range of thinking approaches and to transfer knowledge from one circumstance to another.<br>  <br>Agile learners;<br>Working with an enquiring mind. | |
| Transformations: (2 weeks) | Fluency and reasoning skills:<br><br>Identify, describe and construct congruent and similar shapes, | Students revise and extend their learning from Key Stage 3, exploring all the transformations and constructions, | End of unit assessment | Line symmetry<br>Reflection<br>Diagonal Vertex<br>Side Mirror Line |  <br>Meta-cognition: The ability to knowingly use a wide range of thinking | Mathswatch lesson and homework tasks: |

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| | including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors) | relating these to symmetry and properties of shapes when appropriate. There is an emphasis on describing as well as performing transformations as using the language promotes deeper thinking and understanding | | Rotate Clockwise Anticlockwise Centre Order of rotational symmetry Translation Vector Axes Scale Congruent Vertex Enlargement Scale Factor Multiplier Similar Centre of enlargement Ray | approaches and to transfer knowledge from one circumstance to another.  **Connection finding:** The ability to use connections from the past experiences to seek possible generalisations.  **Agile learners;** Working with an enquiring mind. | |
| Solving Equations. (3 weeks) | **Fluency and reasoning skills:** Solve linear equations in one unknown algebraically (including those with the unknown on both | Students develop their algebraic reasoning by looking at more complex situations. They use their knowledge of sequences and rules | End of unit assessment | Coefficient Linear Simultaneous Eliminate Substitute |  **Complex and Multi-step problem solving:** **The ability to break down a task, decide on a** | Mathswatch lesson and homework tasks: |

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| | sides of the equation).<br>Solve quadratic equations algebraically by factorising - include practical applications - see 2nd paragraph of notes - exam questions.<br>Solve two simultaneous equations in two variables (linear/linear) algebraically; find approximate solutions using a graph | to made inferences. Forming and solving complex equations, including simultaneous equations, is revisited. | | | **suitable approach, and then act.**<br>  <br>**Agile learners;**<br>Working with an enquiring mind. | |
| **Vectors**<br>(1 weeks) | **Fluency and reasoning skills:**<br><br>Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column | Students revisit vectors, consolidate their knowledge and develop increasingly complex chains of reasoning to solve geometric problems. | End of unit assessment | Vector<br>Column<br>Horizontal<br>Vertical<br>Position<br>Parallel |  <br>**Complex and multi-step problem solving:**<br>The ability to break down a task, decide on a suitable approach, and then act. | Mathswatch lesson and homework tasks: |

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| | representations of vectors | | | |  **Agile learners;** Working with an enquiring mind. | |
| **Probability:** (2 weeks) | **Fluency and reasoning skills:**<br><br>Record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees.<br>Enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams. | This block also builds on KS3 and Year 10. Tables and Venn diagrams are revisited and understanding and use of tree diagrams is developed. | End of unit assessment | Event<br>Complement<br>Venn diagram<br>Intersect Union<br>Relative frequency<br>Estimate<br>Expectation<br>Expected value<br>Frequency trees<br>Universal set |  **Complex and multi-step problem solving:** The ability to break down a task, decide on a suitable approach, and then act.<br><br>  **Agile learners;** Working with an enquiring mind. | Mathswatch lesson and homework tasks: |
| Until the summer assessment | FOCUS ON AREAS FOR YOUR SPECIFIC CLASS | | GCSE paper | |  | Mathswatch lesson and homework tasks: |

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| | | | | | **Meta-cognition:** The ability to knowingly use a wide range of thinking approaches and to transfer knowledge from one circumstance to another.<br>  <br>**Connection finding:** The ability to use connections from the past experiences to seek possible generalisations.<br>  <br>**Agile learners;** Working with an enquiring mind. | |