**Curriculum Overview for Mathematics**

**Year 11**

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| **Foundation****Half Term 1: Rounding, Indices, Standard Form****Declarative Knowledge:*** Recognise powers of 2, 3, 4, 5

**Procedural Knowledge:*** Round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures)
* Use inequality notation to specify simple error intervals due to truncation or rounding
* Use positive integer powers and associated real roots (square, cube and higher)
* Calculate with roots and with integer indices
* Calculate with and interpret standard form http://aqamaths.aqa.org.uk/custom_content/8300_Foundation_images/standard_form/a%20x%2010%5En.jpg where http://aqamaths.aqa.org.uk/custom_content/8300_Foundation_images/1%20less%20than%20equal%20to%20a%20less%20than%2010.jpg and `n` is an integer

**Conditional Knowledge:** * Apply and interpret limits of accuracy
* Understand and use place value in context (e.g. when working with very large or very small numbers)
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Standard form Inequality Truncate Round Minimum, Maximum Interval Decimal place Significant figure |
| Checklist RTL | There will be a formal end of half-term exam incorporating the 2 units studied during the half-term. We will re-teach during an Exam Review lesson after the assessment |
| Home | Key Knowledge Organiser test – revise the key knowledge organiser given at the start of the unitDr Frost Maths – practising skills using DrFrostMaths.com (a unique username and password will be provided by the school) |
| **Half Term 1: Inequalities****Declarative Knowledge:*** Know the meaning of inequality
* Know the meaning of less than and more than (or equal to) signs

**Procedural Knowledge:*** Solve linear inequalities in one variable
* Represent the solution set on a number line
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | (Linear) inequality Unknown Manipulate Solve Solution Set Integer |
| Checklist RTL | There will be a formal end of half-term exam incorporating the 2 units studied during the half-term and will recall work from Half-Term 1We will re-teach during an Exam Review lesson after the assessment |
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| **Half Term 1: Algebra and Graphs****Declarative Knowledge:**Know that linear graphs form a straight line**Procedural Knowledge:*** Solve linear equations in one unknown algebraically
* Including those with the unknown on both sides of the equation
* Find approximate solutions using a graph
* Translate simple situations or procedures into algebraic expressions or formulae
* derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution

**Conditional Knowledge:** * Translate simple situations or procedures into algebraic expressions or formulae
* derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Algebra, algebraic, algebraically Unknown Equation Operation Solve Solution Brackets Symbol SubstituteGraph |
| Checklist RTL | There will be a formal end of half-term exam incorporating the 2 units studied during the half-term. We will re-teach during an Exam Review lesson after the assessment |
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| **Half Term 1: Sketching Graphs****Procedural Knowledge:**https://allaboutmaths.aqa.org.uk/custom_content/8300_Foundation_images/further_sketching_graphs/y%20equals%201%20over%20x.jpgRecognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions and the reciprocal function  **Conditional Knowledge:**  | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Function, equation Quadratic, cubic, reciprocal Gradient, y-intercept, x-intercept, root Sketch, plot Kinematic Speed, distance, time Acceleration, deceleration Linear, non-linear Parabola,  |
| Checklist RTL | There will be a formal end of half-term exam incorporating the 2 units studied during the half-term. We will re-teach during an Exam Review lesson after the assessment |
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| **Higher****Half Term 1: Rounding, Indices, Standard form, Surds****Declarative Knowledge:*** Recognise powers of 2, 3, 4, 5

**Procedural Knowledge:*** Round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures)
* Use inequality notation to specify simple error intervals due to truncation or rounding
* Use positive integer powers and associated real roots (square, cube and higher)
* Calculate with roots, and with integer **and fractional** indices
* Understand and use place value (e.g. when working with very large or very small numbers)
* Calculate with and interpret standard form https://allaboutmaths.aqa.org.uk/custom_content/8300_Foundation_images/standard_form/a%20x%2010%5En.jpg where https://allaboutmaths.aqa.org.uk/custom_content/8300_Foundation_images/1%20less%20than%20equal%20to%20a%20less%20than%2010.jpg and `n` is an integer
* **Calculate exactly with surds**
* **Simplify surd expressions involving squares (eg `sqrt 12 = sqrt(4 xx 3) = sqrt 4 xx sqrt 3 = 2 sqrt 3`) and rationalise denominators**
* Recognise and use simple geometric progressions (*rⁿ* where *n* is an integer and ***r* is a surd**)

**Conditional Knowledge:** * Apply and interpret limits of accuracy **including upper and lower bounds**
* **Estimate powers and roots of any given positive number**
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Power Root Index, Indices Standard form Inequality Truncate Round Minimum, Maximum Interval Decimal place Significant figure |
| Checklist RTL | There will be a formal end of half-term exam incorporating the 2 units studied during the half-term. We will re-teach during an Exam Review lesson after the assessment |
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| **Half Term 1: Algebra: quadratics, rearranging, formulae and identities****Declarative Knowledge:*** Know the difference between an equation and an identity

**Procedural Knowledge:*** Simplify and manipulate algebraic expressions (including those involving surds) by:
	+ expanding products of two **or more** binomials
	+ factorising quadratic expressions of the form https://allaboutmaths.aqa.org.uk/custom_content/8300_Foundation_images/Algebra_intro_to_quadratics_/x%5E2%20+%20bx%20+%20c.jpg?cb=20201021 including the difference of two squares
	+ **factorising quadratic expressions of the form**https://allaboutmaths.aqa.org.uk/custom_content/8300_Foundation_images/Algebra_intro_to_quadratics_/x%5E2%20+%20bx%20+%20c.jpg?cb=20201021
	+ simplifying expressions involving sums, products and powers, including the laws of indices
* Understand and use standard mathematical formulae
* Rearrange formulae to change the subject

**Conditional Knowledge:** * Argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments **and proofs**
* Where appropriate, interpret simple expressions as functions with inputs and outputs
* **Interpret the reverse process as the ‘inverse function’**
* **Interpret the succession of two functions as a ‘composite function’**
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Inequality Identity Equivalent Equation Formula, Formulae Expression Expand Linear Quadratic |
| Checklist RTL | There will be a formal end of half-term exam incorporating the 2 units studied during the half-term. We will re-teach during an Exam Review lesson after the assessment |
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| **Half Term 1: Sketching Graphs** **Procedural Knowledge:*** Recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions and the reciprocal function https://allaboutmaths.aqa.org.uk/custom_content/8300_Foundation_images/further_sketching_graphs/y%20equals%201%20over%20x.jpg with https://allaboutmaths.aqa.org.uk/custom_content/8300_Foundation_images/further_sketching_graphs/x%20not%20equal%20to%200.jpg, **exponential functions https://allaboutmaths.aqa.org.uk/custom_content/8300_Foundation_images/further_sketching_graphs/y%20=%20kx.jpgfor positive values of https://allaboutmaths.aqa.org.uk/custom_content/8300_Foundation_images/further_sketching_graphs/k.jpg, and the trigonometric functions (with arguments in degrees) https://allaboutmaths.aqa.org.uk/custom_content/8300_Foundation_images/further_sketching_graphs/y%20=sin%20x,%20y%20=%20cos%20x%20and%20y%20=%20tan%20x.jpg for angles of any size**
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Exponential Function, equation Linear, non-linear Quadratic, cubic, reciprocal, exponential Parabola Asymptote Maximum, minimum, period Gradient, y-intercept, x-intercept, root Sketch, plot Arguments |
| Checklist RTL | There will be a formal end of half-term exam incorporating the 2 units studied during the half-term. We will re-teach during an Exam Review lesson after the assessment |
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| **Foundation** **Half Term 2: Probability****Declarative Knowledge:*** Apply the property that the probabilities of an exhaustive set of outcomes sum to one

**Procedural Knowledge:*** Record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees
* Construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities
* Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes or multiple future experiments

**Conditional Knowledge:** * Understand that empirical unbiased samples tend towards theoretical probability distributions with increasing sample size
* Enumerate sets and combinations of sets systematically using tables, grids, Venn diagrams and tree diagrams
* Calculate the probability of independent and dependent combined events in context, including using tree diagrams and other representations, and know the underlying assumptions
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Outcome, equally likely outcomes Event, independent event, dependent event Tree diagrams Theoretical probability Experimental probability Random Bias, unbiased, fair Relative frequency Enumerate Se |
| Checklist RTL | There will be a formal end of half-term exam incorporating the 2 units studied during the half-term. We will re-teach during an Exam Review lesson after the assessment |
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| **Half Term 2: Vectors****Declarative Knowledge:*** Know that a vector has a magnitude and a direction

**Procedural Knowledge:*** Understand addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representation of vectors

**Conditional Knowledge:** * Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representation of vectors
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Vector Scalar Constant Magnitude |
| Checklist RTL | There will be a formal end of half-term exam incorporating the 2 units studied during the half-term. We will re-teach during an Exam Review lesson after the assessment |
| Home | Key Knowledge Organiser test – revise the key knowledge organiser given at the start of the unitDr Frost Maths – practising skills using DrFrostMaths.com (a unique username and password will be provided by the school) |
| **Half Term 2: Measures****Declarative Knowledge:*** Know standard units of measure and related concepts (length, area, volume / capacity, mass, time, money etc)

**Procedural Knowledge:*** Change freely between related standard units (e.g. time, length, area, volume / capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts
* Use compound units such as speed, rates of pay, unit pricing, density and pressure

**Conditional Knowledge:** * Apply and interpret limits of accuracy
* Use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Direct proportion Inverse proportion Multiplier Linear Congruent, Congruence Similar, Similarity Compound unit Density, Population density PressureTruncate, Round Minimum bound, Maximum bound Interval Decimal place, Significant figure Surd Limit |
| Checklist RTL | There will be a formal end of half-term exam incorporating the 2 units studied during the half-term. We will re-teach during an Exam Review lesson after the assessment |
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| **Higher** **Half Term 2: Further Equations with graphs****Declarative Knowledge:**Know the difference between a linear and a quadratic graph.**Procedural Knowledge:*** Solve linear equations in one unknown algebraically including those with the unknown on both sides of the equation
* Find approximate solutions using a graph
* Solve quadratic equations **(including those that require rearrangement)** algebraically by factorising, **by completing the square and by using the quadratic formula**
* Find approximate solutions using a graph
* Identify and interpret roots, intercepts and turning points of quadratic functions graphically; deduce roots algebraically **and turning points by completing the square**

**Conditional Knowledge:** * Recognise, sketch and interpret graphs of linear and quadratic functions
* Translate simple situations or procedures into algebraic expressions or formulae
* derive an equation, solve the equation and interpret the solution
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Quadratic) equation Factorise Rearrange Complete the square Unknown Manipulate Maximum, minimum Parabola Recurrence relation Interval bisection |
| Checklist RTL | There will be a formal end of half-term exam incorporating the 2 units studied during the half-term. We will re-teach during an Exam Review lesson after the assessment |
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| **Half Term 2: Probability****Declarative Knowledge:****Procedural Knowledge:*** Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions
* **Calculate conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams**
* Enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams

**Conditional Knowledge:** * Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes or multiple future experiments
* Understand that empirical unbiased samples tend towards theoretical probability distributions with increasing sample size
* **Interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams**
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Outcome, equally likely outcomes Event, independent event, dependent event Tree diagrams Theoretical probability Experimental probability Random Bias, unbiased, fair Relative frequency Enumerate Se |
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| **Half Term 2: Vectors****Declarative Knowledge:*** **Know that vectors have a direction and a magnitude.**

**Procedural Knowledge:*** Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representation of vectors

**Conditional Knowledge:** * **Use vectors to construct geometric arguments and proofs**
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Vector Scalar Constant Magnitude |
| Checklist RTL | There will be a formal end of half-term exam incorporating the 2 units studied during the half-term. We will re-teach during an Exam Review lesson after the assessment |
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| **Half Term 2: Measures****Declarative Knowledge:*** Know standard units of measure and related concepts (length, area, volume / capacity, mass, time, money etc)

**Procedural Knowledge:*** Use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate
* Change freely between related standard units (e.g. time, length, area, volume / capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts
* Use compound units such as speed, rates of pay, unit pricing, density and pressure

**Conditional Knowledge:** * Apply and interpret limits of accuracy **including upper and lower bounds**
 | Books | Modelling reading of questions by the class teacher – teaching like a Mathematician Two key words at the start of each lesson defined Expectation of Mathematical vocabulary used in lessons |
| Speech | Direct proportion Inverse proportion Multiplier Linear Congruent, Congruence Similar, Similarity Compound unit Density, Population density PressureTruncate, Round Minimum bound, Maximum bound Interval Decimal place, Significant figure Surd Limit |
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