# Maths Curriculum Plan Spring Term 2021-22

| 7 | Spring 1 | Spring 2 |
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| 7 | **Topics**<br>Directed Number<br>Fractions<br><br>**Knowledge/Understanding**<br>Laws of calculating with negatives.<br>Applying understanding to problem solving and generalising in algebra<br>Understanding equivalence<br>**Addition and subtraction of fractions**<br>**Solving problems with fractions**<br>**Fractions of amounts**<br>**Skills**<br>• Combining skills with order of operations<br>• Justifying reasons for equivalence | **Topics**<br>Fractions, Decimals & Percentages<br>Percentages<br><br>**Knowledge/Understanding**<br>Gain a deep understanding of the links between fractions, decimals and percentages with a focus on equivalence. This will be revisited and developed further later in the year.<br><br>Use the knowledge gained in FDP block and develop to find fractions and percentages of amounts both with and without calculator.<br>Interpret fractions and decimals as mathematical operators.<br><br>**Skills**<br>• Convert between fractions, decimals and percentages<br>• Represent FDP in various ways including bar charts<br>• Consolidate understanding of place value<br>• Move easily between different numerical representations<br>• Apply to real life problems<br>• Understand percentages can be greater than 100%<br>• Find fractions of an amount including real life problems<br>• Find percentage of amounts including real life problems<br>• Use the decimal equivalent to find a fraction or percentage of an amount |
| 8 | **Topics**<br>Lines and Angles<br>Constructions<br><br>**Knowledge/Understanding**<br>**Constructing measuring and using geometric notation**<br>**Developing geometric reasoning**<br>**Skills**<br>• Using a ruler and a protractor accurately | **Topics**<br>Area & Perimeter<br>Transformations<br><br>**Knowledge/Understanding**<br>Understand the difference between area and perimeter<br>Understand the terminology relating to circles<br>Understand why answers may be given as an amount of Pi instead of rounded decimal answer (accuracy) |

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| | | Understand the difference between rotation, reflection, translation and symmetry<br>Understand the difference between co-ordinates and vectors<br><br>**Skills**<br>• Recall and use the different formulae for area relating to triangles, rectangles, parallelograms, trapezia and circles<br>• Have an understanding of where these skills would be used in the real world and apply to real life problems<br>• Link the area of a circle to the ratio of its diameter to its circumference<br>• Use the Pi button correctly on a calculator<br>• Use 3.14 as an approximation of Pi<br>• Give answers as an amount of Pi<br>• Use tracing paper to show reflections, symmetry and rotational symmetry<br>• Link translations to graph work<br>• Use vectors to translate shapes |
| 9 | **Foundation Topics**<br>Angles<br>Representing Data<br><br>**Knowledge/Understanding**<br>Knowing and applying angle facts to problems<br>Understanding how to represent data in a variety of graphs and charts.<br>Being able to interpret information given in tables and graphs<br>**Skills**<br>Identifying which angle fact to use<br>Interpreting the graph in the context given<br><br>**Higher Topics**<br>Sequences/Indices<br>Perimeter and Area<br><br>**Knowledge/Understanding**<br>Applying and using the Index laws<br>Understanding and using the nth term of a linear and quadratic sequence.<br>Reasoning whether a term is part of a sequence<br>Introduction to Iteration<br>**Skills** | **Foundation Topics**<br>Fractions<br>Equations<br><br>**Knowledge/Understanding**<br>Secure understanding of the concept of fractions, how they relate to decimals and percentages<br>Understand conversion between recurring decimals and fractions<br>Understand the process of how to calculate with fractions<br>Understand algebra as the generalisation of number.<br>Understand the conventions of algebra<br>Understand the inverse of functions and why we use these to solve equations.<br>Understand how to manipulate algebraic expressions<br><br>**Skills**<br>• Perform calculations involving fractions<br>• Apply understanding of fractions to mixed topic questions and problem solving.<br>• Calculate fraction increase or decrease and how this relates to percentages.<br>• Solve equations in one variable from two - step, to unknown on both sides involving brackets.<br>• Factorise and solve quadratic equations |

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| | Describing the rule of a pattern. | • Apply algebra to solve questions involving other topics such as shape, angles, probability etc<br><br>**Higher Topics**<br>Ratio<br>Averages<br><br>**Knowledge/Understanding**<br>Understand and apply ratio in context<br>Link ratio to proportion<br>Link ratio and scale factors<br>Direct and inverse proportion<br>Solve problems involving best buys and recipes<br><br>Complete frequency tables and find the mean, mode and median from them for grouped and ungrouped data sets<br>Calculate the range and interquartile range<br>Complete a cumulative frequency graph<br>Complete a box plot graph<br><br>**Skills**<br>• Apply ratio to questions involving maps and scale factors to answer questions in context (SDT)<br>• Obtain a fractional amount from a ratio and a ratio from a fraction<br>• Apply multiplicative reasoning to solve more complex problems, including inverse proportion<br>• Move freely between different numerical, graphical, algebraic and diagrammatic representations of ratio and proportion<br>• Link this work to compound units<br>• Be able to divide in a given ratio<br>• Use and adapt the unitary method<br>•<br>• Be able to find each average and know which one to apply in a given situation<br>• Understand and explain the reasons for grouped and ungrouped data and how each affects the way in which data is presented<br>• Be able to draw a box plot from a cumulative frequency diagram<br>• Explain why averages for grouped data are estimated |

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| 10 | **Topics**<br>Sequences<br>Ratio<br><br>**Knowledge/Understanding**<br>Understanding and using the nth term of a linear and quadratic sequence.<br>Reasoning whether a term is part of a sequence<br>Understand the link between ratio and proportion<br>Apply equivalence to a variety of ratio problems<br>**Skills**<br>Use the equations of direct and inverse proportion.<br>**Higher Topics**<br>Volume<br>Quadratic & Simultaneous Equations<br>**Knowledge/Understanding**<br>Understand the concept of Volume<br>Use formulae to calculate the volume of a variety of 3D shapes, or to find a length given the volume.<br>Solve quadratic and simultaneous equations using a variety of methods<br><br>**Skills**<br>Using and rearranging formulae and rearranging<br>Identifying where Pythagoras must be applied to find a missing length<br>Knowing which method to use | **Topics**<br>Averages<br>Measures<br><br>**Knowledge/Understanding**<br>Know how to calculate mean median mode and range, from data in a list of in a table<br>Know how to draw graphs such as cumulative frequency and box plots<br>Know the difference between discrete and continuous data<br>Know the conversion between metric units of measure.<br>Know how to apply conversion rates between imperial units of measure.<br>Know the effect on conversion rates for area and perimeter<br>Know how to apply the formulae for Speed, Density and Pressure.<br>**Skills**<br>• Apply calculations to find a missing number<br>• Compare sets of data using the averages and understand the advantages and disadvantages of each<br>• Use graphical methods to compare sets of data and understand the limitations of the types of data<br>• Convert between metric and imperial units and make comparisons from real life situations.<br>• Convert between units of area and volume<br>• Apply compound measure formulae to question in context and make comparisons.<br><br>**Higher Topics**<br>Measures<br>Probability<br>**Knowledge/Understanding**<br>Know the conversion between metric units of measure.<br>Know how to apply conversion rates between imperial units of measure.<br>Know the effect on conversion rates for area and perimeter<br>Know how to apply the formulae for Speed, Density and Pressure.<br>Know that probability adds up to 1.<br>Know and understand mutually exclusive.<br>Understand how to use a probability tree for independent and conditional events. |

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| | | Understand the AND/OR rule and how to calculate probabilities as a fraction, decimal or percentage.<br><br>**Skills**<br>• Convert between metric and imperial units and make comparisons from real life situations.<br>• Convert between units of area and volume<br>• Apply compound measure formulae to question in context and make comparisons.<br>• Apply knowledge and understanding of probability to a variety of problems, including using algebra and ratio. |
| 11 | **Topics**<br>Probability<br>Constructions and Loci<br><br>**Knowledge/Understanding**<br>Understand that probability adds up to 1<br>Understand mutual exclusivity.<br>Calculate probability using a variety of methods.<br>How to calculate an expected number of outcomes<br><br>**Skills**<br>Work with fractions, decimal and percentages<br>Work out probability in a variety of situations, including multiple events, independent and conditional<br><br>**Higher Topics**<br>Surds<br>Vectors<br>**Knowledge/Understanding**<br>Understanding simplification and rationalisation of surds.<br>Manipulating expressions involving surds and giving an answer in its simplest form<br>Calculating with column vectors.<br>Applying algebraic skills to solving vector problems<br>**Skills**<br>Expanding brackets<br>Applying equivalence<br>Manipulating algebra | **Topics**<br>3D Shapes<br>Quadratic Graphs<br><br>**Knowledge/Understanding**<br>Know and understand the concepts of drawing 3D shapes in different forms, such as on isometric paper and the different elevations, and nets.<br>Know how to apply the formulae for Volume and Surface Area.<br>Know how to calculate a table of values for quadratic, cubic and reciprocal graphs, with and without a calculator<br><br>**Skills**<br>• Be able to use formulae to calculate volume, surface area or missing lengths.<br>• Use a combination of formulae to calculate volume of surface are of compound shapes or fractions of shapes.<br>• Apply formulae to solve real life problems.<br>• Be able to recognise and match quadratic, cubic, or reciprocal graphs to their equation.<br>• Be able to read roots and solutions off a given graph.<br><br>**Higher Topics**<br>Algebraic Proof<br>Algebraic Fractions<br>**Knowledge/Understanding**<br>Know and understanding how to apply rules of fractions to algebraic situations.<br>Know and understand the algebraic form of multiples, even and odd numbers, and squares<br>**Skills** |

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| | | • Manipulate algebraic expressions to solve or prove concepts. |

# Maths Curriculum Plan Summer Term 2021-22

| 7 | Summer 1 | Summer 2 |
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| | Topics<br>Expressions & Formulae<br>Expressions and equations<br><br>Knowledge/Understanding<br>Understand the difference between expressions, equations and formulae<br>Applying understanding to problem solving and generalising in algebra<br>Understanding equivalence and how to use it to solve equations<br>Know and understand the mathematical language for algebra; term, co-efficient, variable, product, quotient, inverse operation<br>Understand the meaning of like and unlike terms<br>Understand the meaning of equivalence and equality<br>Understand the use of letters for variables<br>Link one and two step equations to linear sequences and graphs<br><br>Skills<br>• Solve one step equations involving + and –<br>• Solve one step equations involving x and ÷<br>• Collect like terms<br>• Use function machines to find an output given an input<br>• Use function machines to solve two step equations<br>• Substitute values into expressions | Topics<br>Constructing, measuring and using geometric notation<br>Developing geometric reasoning<br><br>Knowledge/Understanding<br>Understand the labelling conventions for angles and dimensions including how parallel lines and lines of equal length are denoted<br>Understand angles as a measure of turn<br>Classify angles<br>Understand what is meant by parallel and perpendicular<br>Know the properties of different triangles<br>Know the properties of different quadrilaterals<br>Know the names of polygons up to and including 10 sided<br>Interpret simple pie charts using proportion<br>Know the angle sums for triangles, quadrilaterals and a full turn<br>Know that vertically opposite angles are equal<br><br>Skills<br>• Draw and measure line segments<br>• Draw and measure angles up to 180°<br>• Draw and measure angles between 180° and 360°<br>• Identify perpendicular and parallel lines<br>• Construct triangles given information about their sides and angles<br>• Draw more complex polygons<br>• Draw a pie chart<br>• Interpret simple pie charts using a protractor<br>• Use the sum of angles around a point to solve problems |

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| | • Substitute values into expressions with squared and square root terms | • Use the sum of angles in a straight line to solve problems<br>• Use angle facts for triangles and quadrilaterals to solve problems<br>• Solve more complex angle problems<br>• Find and use the angle sum of any polygon<br>• Investigate angles in parallel lines |
| 8 | Summer 1 | Summer 2 |
| | Topics<br>3D shapes and Volume<br>Constructions and Loci<br><br>Knowledge/Understanding<br>Understand the difference between 2D and 3D shapes and how we can define them<br><br>Understand why volume is cubic units and how it relates to units of length<br><br>Know the formulae for volume of cuboids and prisms and how these relate to area of polygons<br><br>Relate area of 2D shapes to surface area of 3D shapes<br><br>**Key vocabulary for topics:-** polygon, prism, loci, locus, bisect, perpendicular, parallel, compass, protractor, scale, equidistant<br><br>Skills<br>• Using a ruler and a protractor accurately<br>• Use compasses<br>• Recall and use formulae for volume of cuboids and prisms<br>• Draw the net of a cuboid<br>• Draw the net of a prism<br>• Draw the plans and elevations of simple 3D shapes<br>• Draw 3D shapes on isometric paper | Topics<br>Averages<br>Charts and Graphs<br>Probability<br><br>Knowledge/Understanding<br>Understand the difference between each of the three averages and the range<br><br>Know which average is best for a given situation<br>Understand the reasons for different types of chart to display data<br><br>Understand why we use probability and its uses in the real world<br><br>Understand the probability scale and how it is represented, including being able to place events on the scale<br>Know the difference between discrete and continuous data<br><br>**Key vocabulary for topics:-** mean, median, mode, range, distribution, frequency, axis, discrete, continuous, event, comparative, cumulative, correlation<br><br>Skills<br>• Be able to find the mean, mode, median and range for a data set<br>• Be able to find a missing number in a data set given the mean<br>• Be able to represent data on various charts including pictograms, bar charts, pie charts, stem and leaf diagram, frequency polygon, line graph and scatter graph<br>• Be able to draw a line of best fit on a scatter graph and extrapolate from it<br>• Describe the correlation on a scatter graph |

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| | • Calculate the surface area of cuboids and prisms<br>• Calculate a missing length given a volume<br>• Bisect a line<br>• Bisect an angle<br>• Construct the locus of a point<br>• Construct the locus of a line<br>• Construct triangles given criteria relating to sides and angles | • Draw and interpret a stem and leaf diagram<br>• Find the median from a stem and leaf diagram<br>• Plot and interpret frequency polygons and line graphs<br>• Describe the probability of an event<br>• Systematically list outcomes<br>• Compare experimental and theoretical probabilities<br>• Calculate the probability of an event not happening<br>• Find probabilities of equally likely outcomes<br>• Complete and use tree diagrams to find probabilities of independent events<br>• Construct and interpret two way tables |
| 9 | Summer 1 | Summer 2 |
| | **Foundation Topics**<br>Equations and inequalities<br>Congruence and similarity<br><br>**Knowledge/Understanding**<br>Understand the principles and concepts of manipulating algebra.<br>Understand the principles of balancing an equation<br>Understand the inequality symbols<br>Know the four conditions of congruence.<br>Know the effect that scale factor has on a similar shape<br><br>**Skills**<br>• Solve equations with unknowns on one side, both sides and with brackets<br>• Apply algebra to word problems and solve<br>• Represent Inequalities on a number line<br>• Shade regions of a graph representing several inequalities.<br>• Apply the conditions of congruence.<br>• Use scale factors to work out missing lengths<br>• Use scale factors to decide if shapes are similar.<br><br>**Higher Topics**<br>Representing Data<br>Pythagoras' Theorem | **Foundation Topics**<br>Types of data<br>Percentages<br><br>**Knowledge/Understanding**<br>Understand the different types of data and the advantages and disadvantages<br>Secure understanding of the concept of percentages, how they relate to decimals and fractions<br>Understand the process of how to calculate with percentages<br>Know that 'percent' means out of a hundred<br><br>**Skills**<br>• Be able to comment on accuracy of results depending on the type of data used.<br>• Calculate percentages of amounts and use these to increase and decrease by a percentage<br>• Use decimal multipliers when working out percentage problems<br>• Calculate repeated percentage change.<br>• Calculate one amount as a percentage of another.<br>• Use decimal multipliers to find an original amount after a percentage change<br>• Interpret the type of calculation required for word problems<br><br>**Higher Topics**<br>More Graphs<br>Volume |

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| | Trigonometry<br>Inequalities/formulae<br><br>**Knowledge/Understanding**<br>Link proportion to pie charts<br>Understand the difference between composite and comparative bar charts and why we use them<br>Interpret pie charts<br>Understand correlation<br>Know why we have different ways of displaying data<br>Know the difference between bar charts and histograms and which one to use for the given data set<br>Understand when to use Pythagoras and when to use trigonometry<br>Know the mathematical sentences for inequality symbols and use them appropriately<br>Understand that inequalities can be represented as an algebraic statement, on a number line and shown as a region graphically<br>Know the difference between an equation, an identity and a formula<br><br>**Skills**<br>• Construct pie charts<br>• Construct composite and comparative bar charts<br>• Construct a stem and leaf diagram<br>• Find averages and the range from a stem and leaf diagram<br>• Draw and interpret histograms<br>• Draw a scatter graph and identify outliers<br>• Extrapolate from scatter graph<br>• Comment on the correlation of a scatter graph<br>• Use Pythagoras' theorem to find missing sides in right angle triangles<br>• Apply Pythagoras to complex problems including in 3D shapes<br>• Identify which trig ratio to use<br>• Find missing sides using trigonometry | **Knowledge/Understanding**<br>Know the difference between quadratic, cubic, exponential and reciprocal graphs<br>Know how to use iteration to find solutions to complex algebra problems<br>Know the equation of a circle<br>Know the equation of a quadratic<br>Know the equation of a cubic<br>Know the equation of a reciprocal<br>Know the equation of an exponent<br>Know volume relates to the space inside a 3D shape<br>Know the link between linear units and units of capacity<br>Know that surface area relates the total area covering a 3D shape<br>Know the formulae for volume of cone, pyramid and sphere<br>Know the formulae for surface area of cone and sphere<br><br>**Skills**<br>• Draw and interpret quadratic graphs<br>• Draw and interpret cubic graphs<br>• Use iteration to solve a cubic function to a given degree of accuracy<br>• Draw and interpret graphs of reciprocal functions<br>• Draw and interpret exponential graphs<br>• Recall the equation of a circle with origin as centre<br>• Find the equation of a tangent to the circle<br>• Use the formulae for finding volumes of cuboids and prisms<br>• Find the surface area of prisms and cuboids<br>• Find the curved surface area and total surface area of a cone<br>• Find the volume and surface area of a sphere and hemisphere<br>• Find the volume and surface area of cylinders |

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| | • Find missing angles using trigonometry<br>• Find area of triangle using trigonometry<br>• Use the Sine and Cosine rule to find angles or sides in non-right-angled triangles<br>• Represent inequalities on a number line<br>• Solve inequalities graphically<br>• Substitute into formulae<br>• Change the subject of formulae<br>• Use kinematics formulae<br>• Solve quadratic inequalities | |
| 10 | Summer 1 | Summer 2 |
| | **Foundation Topics**<br>Rounding and accuracy<br>Linear Graphs<br><br>**Knowledge/Understanding**<br>Understand the difference between rounding and truncating<br>Understand the rules of rounding and limits of accuracy<br>Understand how the equation of a line connects to the table of values and the graphs<br>Know the effect of changing the gradient of a line.<br><br>**Skills**<br>Be able to use the equation of a line to plot a graph using gradient and y-intercept.<br>Use knowledge of coordinates and equations to solve problems involving linear graphs.<br>Apply equations of a line to interpret real life graphs<br><br>**Higher Topics**<br>Congruence & Similarity<br>Measures<br><br>**Knowledge/Understanding**<br>Know the four conditions of congruence.<br>Know the effect that scale factor has on a similar shape | **Foundation Topics**<br>Area & Perimeter<br>Circles<br><br>**Knowledge/Understanding**<br>Know the definition of area and perimeter<br>Know the formulae for area and perimeter of 2D shapes<br>Know the vocabulary associated with circles.<br>Know the formulae for area and circumference of a circle.<br><br>**Skills**<br>Use formulae to calculate area and perimeter of 2D shapes.<br>Use circle formulae for calculating area and circumference<br>Use area and perimeter formulae to work out missing lengths, including radius and diameter.<br><br>**Higher Topics**<br>Probability<br>Surds<br><br>**Knowledge/Understanding**<br>Understand the probability scale and that probabilities of mutually exclusive events add up to 1<br>Know the definition of a surd.<br>Understand surds and their rules |

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| | Know the conversion rates between metric measures.<br>Know the effect on area and volume of enlargement.<br>Know the formulae for compound measures<br><br>**Skills**<br>Apply the conditions of congruence and use them to prove congruence.<br>Use scale factors to work out missing lengths<br>Use scale factors to decide if shapes are similar<br>Use multiplicative reasoning to prove similarity and solve similarity problems and<br>Use multiplicative reasoning to convert between measure of area and volume<br>Solve more complex problems combining different units of measure.<br>Solve problems of average speed, combined density and pressure. | **Skills**<br>• Calculate simple probabilities of events<br>• Calculate the expected outcomes of an event happening given the number of trials<br>• Use probability trees and Venn Diagrams to work out the probability of event, and of multiple events.<br>• Solve complex problems involving probability<br>• Simplify surds<br>• Rationalise a denominator<br>• Manipulate complex expressions involving surds. |
| 11 | Summer 1 | Summer 2 |
| | **Topics**<br>Targeted revision based Mock exam data<br><br>**Knowledge/Understanding**<br>Know and understand the formulae, concepts,<br>**Skills**<br>To be able to interpret the knowledge needed to answer worded and problem solving questions | |