Year 10 – Mathematics – Higher Tier

| Curriculum intent | Mathematics is a creative and highly interconnected discipline. It is essential to everyday life; underpinning many other subjects such as science, geography and technology and is essential for most forms of employment. Through mathematics lessons we promote mathematical thinking to allow all learners to achieve their mathematical potential and engage in the study of mathematics. Learners are taught strategies to solve problems and are encouraged by teacher modelling to be able to express themselves in mathematical language. The Key Stage 4 scheme of learning builds on the understanding of the interconnected topics from Key Stage 3. Learners will retrieve, affirm and extend their knowledge and understanding as we progress through the curriculum. Learners will follow either the Foundation tier or the Higher Tier pathway. Learners are regularly assessed to ensure that they are following the correct pathway in Mathematics.

The journey at the start of KS4 begins with data handling, learning how to manipulate data to enable comparisons and interpretation. Analytical, problem-solving and reasoning skills are developed throughout the units which are key skills that are required throughout their GCSE studies. Further in-depth study of essential number skills follows with fractions, ratio, proportional reasoning and percentages.

Year 10 continues by moving into algebra where learners will be solving linear and quadratic equations, rearranging equations, and solving inequalities before returning to geometry. They will develop their geometrical reasoning when looking at angles and justifying their reasoning using angle terminology. Geometrical skills are further enhanced when looking at Pythagoras and trigonometry before finding the surface area and volume of complex 3D shapes. Data handling skills are further refined by studying averages and different ways in which to present data. They will critically examine the data to look for trends, make predictions and spot any potential bias.

In the final term, graphs of different types will be studied in depth. Learners will discover how to determine the equation of a line from a graph and how to manipulate the equation of a line to find equations of parallel and perpendicular lines. Key skills of interpreting results, justifying conclusions and deductive reasoning will be enhanced further when studying conditional probability. |
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Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Knowledge	• Two-way tables and Frequency trees • Error Intervals • Upper and Lower Bounds • Fractions • Ratio • Direct Proportion • Proportional Reasoning • Inverse Proportion • Percentages	• Index Laws • Fractional and negative Index Laws • Expanding Brackets • Factorising • Sequences, including Quadratic Sequences • Solving Linear and Quadratic Equations • Forming and Solving Equations • Inequalities	• Changing the Subject • Standard Index Form • Angles in Parallel Lines • Interior and Exterior Angles • Plans and Elevations • Bearings • Pythagoras • Trigonometry	• Circles • Arcs and Sectors • Surface Area and Volume including more complex Shapes • Sampling • Averages • Frequency Diagrams • Scatter Graphs • Pie Charts	• Graphs • Coordinate Geometry • Speed, Distance, Time • Compound Measures • Real-life Graphs • Congruence • Similar Shapes inc. 2D & 3D Shapes	• Transformations • Probability • Probability Trees • Conditional Probability • Venn Diagrams • Simultaneous Equations • Quadratic Simultaneous Equations

Skills						
	• Read, use, interpret and design two-way tables and frequency trees. • Round to a given degree of accuracy and use bounds in calculations. • Use the four operations with fractions and mixed numbers. • Simplify, compare and use equivalent ratios and share an amount in a ratio. • Solve problems involving direct proportion, including worded problems, using graphs and using the unitary method. •Understand the relationship between direct proportion and inverse proportion and solve problems. • Calculate percentage increase/decrease both with and without a calculator. • Make calculations involving repeated percentage change. • Find the original amount when given the new amount.	• Use the laws of indices to multiply and divide numbers and/or algebraic terms written in index notation. • Be able to apply laws of indices when fractional and/or negative. • Manipulate and simplify algebraic expressions. • Factorise algebraic expressions by taking out common factors. • Factorise quadratic expressions. • Find and use the nth term of arithmetic and quadratic sequences. • Solve linear equations, in which the unknown appears on either side or on both sides of the equation, including brackets and fractional and/or negative terms. • Solve quadratic equations by factorising and by using the formula. • Solve linear and quadratic inequalities.	• Change the subject of a formula and more advanced formulae where the subject appears more than once. • Convert large and small numbers into standard form and vice versa. • Use the four operations with numbers in standard form, with or without a calculator. • Find missing angles using angle facts and demonstrate understanding of the properties of angles in 2D shapes and in parallel lines. • Understand and draw front and side elevations and plans of shapes. • Read, use and interpret bearings. • Use Pythagoras' Theorem. • Use the trigonometric ratios sine, cosine and tan, to find angles and lengths. • Know the exact values of trigonometric ratios for given degrees.	• Recall and use formulae for the circumference and area of a circle. • Calculate the area and perimeter of compound shapes made from triangles, rectangles, trapezia, circles and parallelograms. • Find the surface area and volume of prisms, including compound solids, spheres, frustums, and pyramids. • Plan, collect and analyse data to complete a statistical investigation. • Calculate and interpret the mean, median, mode and range from discrete and continuous data. • Produce and interpret frequency diagrams for discrete and continuous data. • Interpret line graphs. • Draw and interpret scatter graphs. Draw a line of best fit. Interpolate and extrapolate trends. Identify and interpret correlation.	• Plot, draw and interpret straight line graphs, with or without a table of values. • Plot, draw and interpret quadratic, cubic and reciprocal graphs. • Be able to recognise a type of graph from its shape. • Interpret and use $y = mx + c$ with straight line graphs. • Understand, use and convert between metric speed measures. • Calculate using speed, distance and time. • Understand and calculate with pressure, force and area. • Read, draw and interpret real life graphs such as conversion and distance-time graphs. • Identify and use the rules of congruence for triangles. • Identify similar shapes, find, and use the scale factor to find missing lengths, areas and volumes.	• Be able to transform shapes by rotation, reflection, and translation on a coordinate grid. • Be able to enlarge a shape by a scale factor including negative and/or fractional scale factors. • Calculate the probability of an event or multiple events occurring. •Use, design, and interpret probability trees. • Given an event has happened, use conditional probability to determine a subsequent event. • Use, interpret, and draw Venn Diagrams: use them to find the probability of an event happening. • Solve linear simultaneous equations including forming the equations. • Solve quadratic simultaneous equations including the use of curves and circles.

Assessments	• Regular low stakes assessments at the end of each topic. • Past GCSE Paper – non-calculator.	• Regular low stakes assessments at the end of each topic.	• Regular low stakes assessments at the end of each topic. • Past GCSE Paper – calculator.	• Regular low stakes assessments at the end of each topic.	• Regular low stakes assessments at the end of each topic. • Year 10 Mock Week Past GCSE papers 1 x – non-calculator 2 x calculator	• Regular low stakes assessments at the end of each topic. • Past GCSE Paper – calculator.
Enrichment	• Have you had your five a day? Consolidate your learning by completing the Corbettmaths five a day. Visit https://corbettmaths.com/ to find daily questions to challenge you. • Plan a holiday. Will you choose to go abroad? What would the costs be? Do you need to convert currencies? How do you know you are getting the best value for money? • Need some help with finances? Use the RBS MoneySense to help you make the most of your money. https://rbs.mymoneysense.com/home/	• Been asked to take part in the UKMT Maths Challenge in February? Visit https://www.interactive-maths.com/ukmt-random-question-generator.html to try out some of the questions. • Would you trust the tabloids? Match the cards and figure it out on https://nrich.maths.org/12172 • What careers can you find that use algebra? Research where it is used in real life and write a newspaper article to summarise your findings.	• Can you draw a plan, side and front elevation of Rayner Stephens High School? • How would you design a stadium so that all spectators had a good view? https://nrich.maths.org/7484 • What is the link with the game Tetris and maths? Can you explain? Have a go at Factris on to get you started. https://mathigon.org/factris	• Why might a bricklayer need to know the importance of 3, 4, 5 bricks? How can you help with that? • Can you use your surface area understanding to crack the following problem? https://nrich.maths.org/ninecolours • Can you crack the code? Use your code breaking and cipher skills and take part in the Alan Turing Cryptography Competion on https://www.maths.manchester.ac.uk/cryptography_competition/	• Where can you find statistics being used to persuade you? Look in newspapers and check advertisements to see if you think their claims are as good as they seem? • Consider how diagrams can be misleading – why might they do so, and can you present the data in a different way? • Why would people lie when answering a questionnaire and what can you do about it? Try this https://nrich.maths.org/13897 to discover more.	• Being green is a good thing but take the carbon footprints challenge. Analyse the data to test it yourself. https://nrich.maths.org/6508 • Can you solve the speed-time problems at the Olympics? https://nrich.maths.org/7322 • Apply your graphs skills to real-life properties and applications of graphs and networks on https://mathigon.org/course/graph-theory/introduction