

Subject Overview Mathematics – Year 10 Higher

Using their strong mathematical roots from key stage 3, students will extend their mathematical knowledge and skills by learning how to tackle more demanding contextual and often abstract GCSE problems that require a firm grasp of, data, geometry, and particularly algebra.

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Knowledge & Skills	<p>U1 Accuracy & Bounds (9 Lessons) Find upper and lower bounds of accuracy in $+$ $-$ \times \div calculations in context.</p> <p>U2 Advance Data Analysis (10 Lessons) Construct and interpret data using frequency polygons, cumulative frequency graphs, histograms & boxplots</p> <p>U3 Advance Proportion (8 Lessons) Use direct & inverse proportion to solve complex problems. Express relationships using algebra</p> <div style="border: 1px solid black; padding: 5px;"> <p>AP1 Assessment</p> <ul style="list-style-type: none"> • Error Intervals • UB & LB calculations • Frequency Polygons • Boxplots • Cumulative Freq. Graphs • Histograms • Workrate Problems • Direct & Inverse proportion </div>	<p>U4 Simultaneous Equations (10 Lessons) Form & solve linear simultaneous equations algebraically & graphically. First 4 lesson are at the end of HT1.</p> <p>U6 Non-Linear Graphs (8 Lessons) Explore the graphs of quadratics, cubic, reciprocals, exponentials & circles</p> <div style="border: 1px solid black; padding: 5px;"> <p>Checkpoint 1</p> <ul style="list-style-type: none"> • Solve simultaneous equation graphically & algebraically. • Quadratic Graphs • Cubic Graphs • Reciprocal Graphs • Circle Graphs </div> <p>U5 Quadratic Equations (15 Lessons) by factorising, using the formula, rearranging, and iteration.</p>	<p>U7 Advance Fractions (10 Lessons) Perform $+$ $-$ \times \div with algebraic fractions. Rationalise the denominator of a fraction</p> <p>U8 Circle Theorems (10 Lessons) Know and use the circle theorems to solve multi-step angle reasoning problems.</p> <div style="border: 1px solid black; padding: 5px;"> <p>AP2 Assessment</p> <ul style="list-style-type: none"> • AP1 Assessment topics • Checkpoint 1 topics • Solve quadratic equations by factorising & formula • Complete the square • Iteration • $+$ $-$ \times \div algebraic fractions </div> <p>U9 Further Probability (5 Lessons) of more than one event using two-way tables, sample space diagrams, tree diagrams & Venn diagrams – Set Theory</p>	<p>U9 Further Probability (15 Lessons) Continued from HT3</p> <div style="border: 1px solid black; padding: 5px;"> <p>Checkpoint 2</p> <ul style="list-style-type: none"> • Circle Theorems • Writing probability • Capture-recapture • Product rule - counting • Venn Diagrams • Tree Diagrams </div> <p>U10 Advance Area & Volume (6 Lessons) Spheres, cones, pyramids including complex compound 3D shapes. Explore area & volume proportion problems with similar 3D solids. Calculate arc lengths & area of sectors.</p>	<p>U10 Advance Area & Volume (12 Lessons) Continued from HT4</p> <div style="border: 1px solid black; padding: 5px;"> <p>AP3 Assessment</p> <ul style="list-style-type: none"> • AP1 topics • AP2 topics • Checkpoint 2 topics • Area of sectors • Length of an arc • Surface area & volume of 3D shapes </div> <p>U11 Linear Inequalities (7 Lessons) Represent, construct & solve inequalities. Identify feasible regions on graphs</p>	<p>U11 Linear Inequalities (3 Lessons) Continued from HT5</p> <p>U12 Advance Triangles (15 Lessons) Use Trigonometry and Pythagoras with problems in 3D. Extend the use of trigonometry to non-righted angled triangles.</p> <div style="border: 1px solid black; padding: 5px;"> <p>Checkpoint 3</p> <ul style="list-style-type: none"> • Linear inequalities • Graphing linear inequalities • Exact Trigonometric values • Pythagoras' Theorem & Trigonometry in 3D • $1/2ab\sin C$ • Sine & Cosine Rule </div> <p>U13 Functions (15 Lessons) Solve numerical & algebraic problems with functions</p>
	Beyond The Curriculum	<p>Moneyball (Film) Baseball team uses data to win big with a small budget. Ideas used by football teams today.</p> <p>How to Invent Everything By Ryan North Stranded in the past? A guide for how to rebuild everything using maths & science.</p>	<p>Hidden Figures (Film) Based on a true story about four NASA women mathematicians vital in the space race.</p> <p>You Tube Basketball always goes in This video breaks down the math and engineering, using quadratic equations, to build an unmissable basketball hoop.</p>	<p>Ten Reasons We're Wrong About The World By Hans Rosling This book uses data to show how global progress is better than our instincts suggest.</p> <p>21 (Film) Inspired by a true story. MIT students show the power of probability in the real world.</p>	<p>The Martian (Audiobook) By Andy Weir Mark is stranded in space. He needs engineering & maths to survive & get home.</p> <p>YouTube- Earth How the circumference of the earth was found in BC with only a stick & the sun.</p>	<p>Deepwater Horizon (Film) Epic engineering failure: See why maths matters!</p> <p>Shoe Dog (Audiobook) By Phil Knight Story of how Nike was built from a \$50 loan to the global empire it is today.</p>

Subject Overview Mathematics – Year 10 Foundation

Using their strong mathematical roots from key stage 3, students will extend their mathematical knowledge and skills by learning how to tackle more demanding contextual GCSE problems that require a firm grasp of, data, geometry, algebra, and particularly number, ratio and proportion.

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Knowledge & Skills	<p>U1 Angles & Reasoning (15 Lessons) Use formal notation and geometric reasoning statements to explain the steps taken in angle problems.</p> <p>U2 Indices (13 Lessons) Apply index laws to numerical or algebraic expressions. Calculate in standard form</p> <div style="border: 1px solid black; padding: 5px;"> <p>AP1 Assessment</p> <ul style="list-style-type: none"> • Mutli-step angle problems • Angles & parallel lines • $+$ $-$ \times \div Standard Form • Use index laws • Recipocal of numbers </div> <p>U3 Displaying Data (5 Lessons) Construct and interpret a range of different graphs and charts to understand how they display different aspects of data. Continued for 5 lessons in HT2.</p>	<div style="border: 1px solid black; padding: 5px;"> <p>Checkpoint 1</p> <ul style="list-style-type: none"> • Dual & composite bar graphs • Pictograms • Pie Charts • Scattergraphs • Percentage Change </div> <p>U4 Further Percentages (9 Lessons) Solve a range of contextual percentage problems, including percentage profit/loss and reverse percentage.</p> <p>U5 Further Expressions (9 Lessons) Extend Y9 algebraic manipulation skills to work with quadratic expressions. Learn to solve a mix of abstract and contextual problems.</p> <p>U6 Further Proportion (8 Lessons) Use direct proportion to work with recipes, currency conversion, and speed-distance-time.</p>	<p>U7 Further Probability (11 Lessons) Probability of more than one event using two-way tables, sample space diagrams, and Venn diagrams.</p> <div style="border: 1px solid black; padding: 5px;"> <p>AP2 Assessment</p> <ul style="list-style-type: none"> • AP1 Assessment topics • Checkpoint 1 topics • Substitution • Simplify alegebraic fractions • Expand & simplify quadratics </div> <p>U8 Volume & Surface Area (11 Lessons) Calculate the area of 2D shapes including circles. Find the surface area and volume of 3D prisms. Work with compound units like density and pressure</p>	<p>U8 Volume & Surface Area (7 Lessons) Continued from HT3</p> <div style="border: 1px solid black; padding: 5px;"> <p>Checkpoint 2</p> <ul style="list-style-type: none"> • Area & perimeter of 2D shapes inc. circles • Volume & surface area of prisms • Density, mass, volume • Pressure, area, force • Form & solve • Solve inequalities </div> <p>U9 Inequalities (8 Lessons) Represent inequalities in a variety of forms. Create & solve linear inequalities.</p> <p>U10 Accuracy & Bounds (9 Lessons) Find upper and lower bounds of accuracy in $+$ $-$ \times \div calculations in context.</p>	<p>U11 Real life Graphs (11 Lessons) Construct and interpret liner graphs in context</p> <div style="border: 1px solid black; padding: 5px;"> <p>AP3 Assessment</p> <ul style="list-style-type: none"> • AP1 Assessment topics • AP2 Assessment topics • Checkpoint 2 topics • Conversion graphs • Distance-time graphs • Interpreting gradients • Error Intervals </div> <p>U12 Non linear Graphs (5 Lessons) Explore the graphs of quadratics, cubic, reciprocals</p> <p>U13 Pythagoras & Trigonometry (3 Lessons) Use Pythagoras & trigonometry to solve a geometric problems in 2D. Continued for 8 lessons in HT2</p>	<p>U14 Vectors (4 Lessons) Understand column vectors as a measure of direction & magnitude. Calculate with column vectors</p> <div style="border: 1px solid black; padding: 5px;"> <p>Checkpoint 3</p> <ul style="list-style-type: none"> • Graphing quadratic, cubic & reciprocal equations • Pthagoras's Theorem • Trigonometry • Column vectors • $+$ $-$ column vectors </div> <p>U15 Transformation (13 Lessons) Construct and describe reflections, rotations, translations & enlargements on coordinate axes.</p> <p>U16 Similarity & Congruence (3 Lessons) Understand the difference between similar & congruent shapes. Solve problems with similar shapes</p>
	Beyond The Curriculum	<p>Rastrick Coding Club Join to learn how to code basic functions of a game using your knowledge of geometry.</p> <p>Moneyball (Flim) Baseball team uses data to win big with a small budget. Ideas used by football teams today</p>	<p>You Tube Basketball always goes in Explore the the maths and engineering needed to build an unmissable basketball hoop.</p> <p>Hidden Figures (Film) Based on a true story about four NASA women mathematicians vital in the space race.</p>	<p>21 (Film) Inspired by a true story. MIT students show the power of probability in the real world.</p> <p>The Curious Incident of the Dog in the Night-time By Mark Haddon Teen solves a dog mystery, using logic & his probability skills.</p>	<p>Dream Big (Film) Explores incredible feats of engineering & the maths behind them.</p> <p>You Tube World's Heaviest Weight Explore the precision required to define & measure a kilogram.</p>	<p>You Tube Triangles are everywhere Explanation of what trigonometry is & its wide application.</p> <p>You Tube Game development Explore how basic trigonometry makes your video games work.</p>

Subject Overview Mathematics – Year 10 Building a Mathematician

Using their firm grasp of core mathematical areas & ability to work in context students will extend their knowledge and skills by learning how to tackle more demanding contextual GCSE problems that require a firm grasp of, data, geometry, algebra, and particularly number, ratio, and proportion.

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Knowledge & Skills	<p>U1 Number Sense (13 Lessons) Solve multi-step GCSE style number problems with & without a calculator.</p> <p>U2 Directed Numbers (7 Lessons) Solve GCSE problems with directed numbers.</p> <p>U3 FDP Equivalence & Calculations (9 Lessons) Solve multi-step problems in context using four operations with fractions, decimals & percentages.</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>AP1 Assessment</p> <ul style="list-style-type: none"> • + - x ÷ numbers • + - x ÷ directed numbers • Ordering FDP • + - x ÷ fractions </div> <p>U4 Simplify & Solve (7 Lessons) See HT2 for details.</p>	<p>U4 Simplify & Solve (9 Lessons) Form and solve equations from a range of different contexts. Understand how to rearrange common formulae from the real world.</p> <p>U5 Angles & Reasoning (13 Lessons) Solve multi-step angle problems involving parallel lines. Continue to develop formal reasoning skills.</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Checkpoint 1</p> <ul style="list-style-type: none"> • Simplify, expand & factorise expressions • Form & solve equations • Rearrange formulae • Angles & parallel lines. • Angles & polygons </div> <p>U6 Further Percentages (10 Lessons) Solve GCSE percentage problems with & without a calculator. Learn how to calculate percentage change.</p>	<p>U7 Sequences (8 Lessons) Find & use the nth term of a linear sequence to solve problems.</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>AP2 Assessment</p> <ul style="list-style-type: none"> • AP1 assessment topics • Checkpoint 1 topics • Percentage calculations • Percentage change • nth term & sequences </div> <p>U8 Further Ratio & Proportion (13 Lessons) Solve a range of GCSE style problems involving ratio & proportion.</p> <p>U9 Straight Line Graphs (4 Lessons) Represent a linear equation graphically. Understand the concept of gradient & y-intercept. Use this to describe a line with its equation.</p>	<p>U9 Straight Line Graphs (8 Lessons) Continued from HT3.</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Checkpoint 2</p> <ul style="list-style-type: none"> • Simplifying ratio • Sharing by ratio • Proportion problems • Straight line graphs • $y=mx+c$ </div> <p>U10 Further Area & Perimeter (9 Lessons) Solve GCSE style problems involving area & perimeter of 2D Shapes, including circles.</p> <p>U11 Averages & Spread (3 Lessons) Solve GCSE style problems involving mean, median, mode & the range. Estimate averages from grouped tables.</p>	<p>U11 Averages & Spread (6 Lessons) Continued from HT4</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>AP3 Mocks Exams</p> <ul style="list-style-type: none"> • AP1 & AP2 topics • Checkpoint 1 & 2 topics • Area & perimeter of 2D Shapes inc. circles • Mean, median, mode • Averages from tables </div> <p>U12 Plans & Elevations (11 Lessons) Explore 3D shapes through their nets & their different elevations. Construct triangles with a ruler, protractor & a pair of compasses.</p> <p>U13 Volume & Surface Area (4 Lessons) Calculate surface area & volume of prisms. Explore concepts of density & pressure.</p>	<p>U13 Volume & Surface Area (7 Lessons) Continued from HT5.</p> <p>U14 Representing Data (9 Lessons) Explore GCSE problems involving data graphs such as pie charts, frequency polygons & scatter graphs.</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Checkpoint 3</p> <ul style="list-style-type: none"> • Plans & elevations • Nets of 3D Shapes • Constructing triangles • Surface area & volume of Prisms • Pie Charts • Scatter graphs • Frequency Polygons </div> <p>U15 Further Probability (8 Lessons) Explore finding the probability of combined events using probability-space & tree diagrams.</p>
	Beyond The Curriculum	<p>First Careers (Website) Pick a career and see what's involved. Can search by subject.</p> <p>Money Skills By Ferne Bowe Learn how to manage your money as an adult in the real world. Learn about everything from understanding tax to saving money.</p>	<p>The Escaporium (Halifax) You may visit & challenge your mind in an exciting escape room, where logic and maths are your keys to freedom.</p> <p>Guinness World Records (book) Discovering incredible achievements and seeing how percentages measure them!</p>	<p>Science & Media Museum (Bradford) You may visit & see how graphs & equations are used to interpret the real world.</p> <p>CodeGirl (Film Netflix) Documentary follows high school girls globally coding apps to solve community problems, bridging tech's gender gap.</p>	<p>Science+Industry Museum (Manchester) You may visit & explore innovations: from industrial power to atomic science. See maths is behind it all.</p> <p>Ford v Ferrari (Film) Shows how precise measurements are critical for high-performance design.</p>	<p>Mario Maker 2 (Nintendo Switch) Design your own levels in Mario Maker and watch your carefully planned ideas come to life!</p> <p>Amazing Origami Kit By Tuttle Editors Fold 2D paper nets into amazing 3D shapes</p>