

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	U1 Accuracy & Bounds (9 Lessons) Find upper and lower bounds of accuracy in $+$ $-$ $\times$ $\div$ calculations in context. U2 Advance Data Analysis (10 Lessons) Construct and interpret data using frequency polygons, cumulative frequency graphs, histograms & boxplots U3 Advance Proportion (8 Lessons) Use direct & inverse proportion to solve complex problems. Express relationships using algebra AP1 Assessment - Error Intervals - UB & LB calculations - Frequency Polygons - Boxplots - Cumulative Freq. Graphs - Histograms - Workrate Problems - Direct & Inverse proportion	U4 Simultaneous Equations (10 Lessons) Form & solve linear simultaneous equations algebraically & graphically. First 4 lesson are at the end of HT1. U6 Non-Linear Graphs (8 Lessons) Explore the graphs of quadratics, cubic, reciprocals, exponentials & circles U5 Quadratic Equations (15 Lessons) by factorising, using the formula, rearranging, and iteration. Checkpoint 1 - Solve simultaneous equation graphically & algebraically. - Quadratic Graphs - Cubic Graphs - Reciprocal Graphs - Circle Graphs	U7 Advance Fractions (10 Lessons) Perform $+$ $-$ $\times$ $\div$ with algebraic fractions. Rationalise the denominator of a fraction U8 Circle Theorems (10 Lessons) Know and use the circle theorems to solve multi-step angle reasoning problems. AP2 Assessment - AP1 Assessment topics - Checkpoint 1 topics - Solve quadratic equations by factorising & formula - Complete the square - Iteration $+$ $-$ $\times$ $\div$ algebraic fractions U9 Further Probability (6 Lessons) of more than one event using two-way tables, sample space diagrams, tree diagrams & Venn diagrams – Set Theory	U9 Further Probability (14 Lessons) Continued from HT3 Checkpoint 2 - Circle Theorems - Writing probability - Capture-recapture - Product rule - counting - Venn Diagrams - Tree Diagrams U10 Advance Area & Volume (7 Lessons) Spheres, cones, pyramids including complex compound 3D shapes. Explore area & volume proportion problems with similar 3D solids. Calculate arc lengths & area of sectors.	U10 Advance Area & Volume (11 Lessons) Continued from HT4 AP3 Assessment - AP1 topics - AP2 topics - CP1 & CP2 topics - Area of sectors - Length of an arc - Surface area & volume of 3D shapes U11 Linear Inequalities (7 Lessons) Represent, construct & solve inequalities. Identify feasible regions on graphs	U11 Linear Inequalities (3 Lessons) Continued from HT5 U12 Advance Triangles (15 Lessons) Use Trigonometry and Pythagoras with problems in 3D. Extend the use of trigonometry to non-righted angled triangles. Checkpoint 3 - Linear inequalities - Graphing linear inequalities - Exact Trigonometric values - Pythagoras' Theorem & Trigonometry in 3D $1/2ab\sin C$ - Sine & Cosine Rule U13 Functions (15 Lessons) Solve numerical & algebraic problems with functions
Beyond The Curriculum	Moneyball (Film) Baseball team uses data to win big with a small budget. Ideas used by football teams today. How to Invent Everything By Ryan North Stranded in the past? A guide for how to rebuild everything using maths & science.	Hidden Figures (Film) Based on a true story about four NASA women mathematicians vital in the space race. You Tube Basketball always goes in This video breaks down the math and engineering, using quadratic equations, to build an unmissable basketball hoop.	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. 21 (Film) Inspired by a true story. MIT students show the power of probability in the real world.	The Martian (Audiobook) By Andy Weir Mark is stranded in space. He needs engineering & maths to survive & get home. YouTube- Earth How the circumference of the earth was found in BC with only a stick & the sun.	Deepwater Horizon (Film) Epic engineering failure: See why maths matters! Shoe Dog (Audiobook) By Phil Knight Story of how Nike was built from a \$50 loan to the global empire it is today.	YouTube Trigonometry in real life Explanation how trigonometry is used everywhere. We just don't know enough to see it. YouTube Game development Explore how basic trigonometry makes your video games work.

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	U1 Angles & Reasoning (15 Lessons) Use formal notation and geometric reasoning statements to explain the steps taken in angle problems. U2 Indices (13 Lessons) Apply index laws to numerical or algebraic expressions. Calculate in standard form AP1 Assessment • Mutli-step angle problems • Angles & parallel lines • $+$ $-$ $\times$ $\div$ Standard Form • Use index laws • Recipocal of numbers 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.	U4 Further Percentages (9 Lessons) Solve a range of contextual percentage problems, including percentage profit/loss and reverse percentage. Checkpoint 1 • Dual & composite bar graphs • Pictograms • Pie Charts • Scattergraphs • Percentage Change 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. U6 Further Proportion (8 Lessons) Use direct proportion to work with recipes, currency conversion, and speed-distance-time.	U7 Further Probability (11 Lessons) Probability of more than one event using two-way tables, sample space diagrams, and Venn diagrams. AP2 Assessment • AP1 Assessment topics • Checkpoint 1 topics • Substitution • Simplify algebraic fractions • Expand & simplify quadratics 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	U8 Volume & Surface Area (7 Lessons) Continued from HT3 U9 Inequalities (8 Lessons) Represent inequalities in a variety of forms. Create & solve linear inequalities. Checkpoint 2 • Area & perimeter of 2D shapes inc. circles • Volume & surface area of prisms • Density, mass, volume • Pressure, area, force • Form & solve • Solve inequalities U10 Accuracy & Bounds (9 Lessons) Find upper and lower bounds of accuracy in $+$ $-$ $\times$ $\div$ calculations in context.	U11 Real life Graphs (11 Lessons) Construct and interpret liner graphs in context AP3 Assessment • AP1 Assessment topics • AP2 Assessment topics • Checkpoint 2 topics • Conversion graphs • Distance-time graphs • Interpreting gradients • Error Intervals U12 Non linear Graphs (5 Lessons) Explore the graphs of quadratics, cubic, reciprocals U13 Pythagoras & Trigonometry (3 Lessons) Use Pythagoras & trigonometry to solve a geometric problems in 2D. Continued for 8 lessons in HT2	U14 Vectors (4 Lessons) Understand column vectors as a measure of direction & magnitude. Calculate with column vectors Checkpoint 3 • Graphing quadratic, cubic & reciprocal equations • Pthagoras's Theorem • Trigonometry • Column vectors • $+$ $-$ column vectors U15 Transformation (13 Lessons) Construct and describe reflections, rotations, translations & enlargements on coordinate axes. U16 Similarity & Congruence (3 Lessons) Understand the difference between similar & congruent shapes. Solve problems with similar shapes
	Rastrick Coding Club Join to learn how to code basic functions of a game using your knowledge of geometry. Moneyball (Flim) Baseball team uses data to win big with a small budget. Ideas used by football teams today	You Tube Basketball alway goes in Explore the the maths and engineering needed to build an unmissable basketball hoop. Hidden Figures (Film) Based on a true story about four NASA women mathematicians vital in the space race.	21 (Film) Inspired by a true story. MIT students show the power of probability in the real world. The Curious Incident of the Dog in the Night-time By Mark Haddon Teen solves a dog mystery, using logic & his probability skills.	Dream Big (Film) Explores incredible feats of engineering & the maths behind them. You Tube World's Heaviest Weight Explore the precision required to define & measure a kilogram.	You Tube Triangles are everywhere Explanation of what trigonometry is & its wide application. You Tube Game development Explore how basic trigonometry makes your video games work.	You Tube What is a vector? Vectors: elegant, useful math, vital for physicists, air traffic controllers, and game creators What If? By Randall Munroe Will make you see geometry in the most unexpected places.

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	U1 Number Sense (13 Lessons) Solve multi-step GCSE style number problems with & without a calculator. U2 Directed Numbers (7 Lessons) Solve GCSE problems with directed numbers. U3 FDP Equivalence & Calculations (9 Lessons) Solve multi-step problems in context using four operations with fractions, decimals & percentages. AP1 Assessment • $+$ $-$ $\times$ $\div$ numbers • $+$ $-$ $\times$ $\div$ directed numbers • Ordering FDP • $+$ $-$ $\times$ $\div$ fractions U4 Further Simplify & Solve (7 Lessons) See HT2 for details.	U4 Further Simplify & Solve (9 Lessons) Form and solve equations from a range of different contexts. Understand how to rearrange common formulae from the real world. U5 Angles & Reasoning (13 Lessons) Solve multi-step angle problems involving parallel lines. Continue to develop formal reasoning skills. Checkpoint 1 • Simplify, expand & factorise expressions • Form & solve equations • Rearrange formulae • Angles & parallel lines. • Angles & polygons U6 Further Percentages (10 Lessons) Solve GCSE percentage problems with & without a calculator. Learn how to calculate percentage change.	U7 Sequences (8 Lessons) Find & use the n th term of a linear sequence to solve problems. AP2 Assessment • AP1 assessment topics • Checkpoint 1 topics • Percentage calculations • Percentage change • nth term & sequences U8 Further Ratio & Proportion (13 Lessons) Solve a range of GCSE style problems involving ratio & proportion. 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.	U9 Straight Line Graphs (8 Lessons) Continued from HT3. Checkpoint 2 • Simplifying ratio • Sharing by ratio • Proportion problems • Straight line graphs • $y=mx+c$ U10 Further Area & Perimeter (11 Lessons) Solve GCSE style problems involving area & perimeter of 2D Shapes, including circles. U11 Averages & Spread (3 Lessons) Solve GCSE style problems involving mean, median, mode & the range. Estimate averages from grouped tables.	U11 Averages & Spread (6 Lessons) Continued from HT4 AP3 Mocks Exams • AP1 & AP2 topics • Checkpoint 1 & 2 topics • Area & perimeter of 2D Shapes inc. circles • Mean, median, mode • Averages from tables U12 Plans & Elevations (11 Lessons) Explore 3D shapes through their nets & their different elevations. Construct triangles with a ruler, protractor & a pair of compasses.	U13 Volume & Surface Area (12 Lessons) Calculate surface area & volume of prisms. Explore density & pressure. U14 Representing Data (9 Lessons) Explore GCSE problems involving data graphs such as pie charts, frequency polygons & scatter graphs. Checkpoint 3 • Plans & elevations • Nets of 3D Shapes • Constructing triangles • Surface area & volume of Prisms • Pie Charts • Scatter graphs • Frequency Polygons U15 Further Probability (8 Lessons) Explore finding the probability of combined events using probability-space & tree diagrams.
	First Careers (Website) Pick a career and see what's involved. Can search by subject. 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.	The Escaporium (Halifax) You may visit & challenge your mind in an exciting escape room, where logic and maths are your keys to freedom. Guinness World Records (book) Discovering incredible achievements and seeing how percentages measure them!	Science & Media Museum (Bradford) You may visit & see how graphs & equations are used to interpret the real world. CodeGirl (Film Netflix) Documentary follows high school girls globally coding apps to solve community problems, bridging tech's gender gap.	Science+Industry Museum (Manchester) You may visit & explore innovations: from industrial power to atomic science. See maths is behind it all. Ford v Ferrari (Film) Shows how precise measurements are critical for high-performance design.	Mario Maker 2 (Nintendo Switch) Design your own levels in Mario Maker and watch your carefully planned ideas come to life! Amazing Origami Kit By Tuttle Editors Fold 2D paper nets into amazing 3D shapes	Maths Appeal (Podcast) Join two maths fans on their mission to make maths accessible. Experience maths brought to life! Football Manager Game Available for IOS & Android. Try your hand at managing a team by looking at the stats & finances to win trophies.