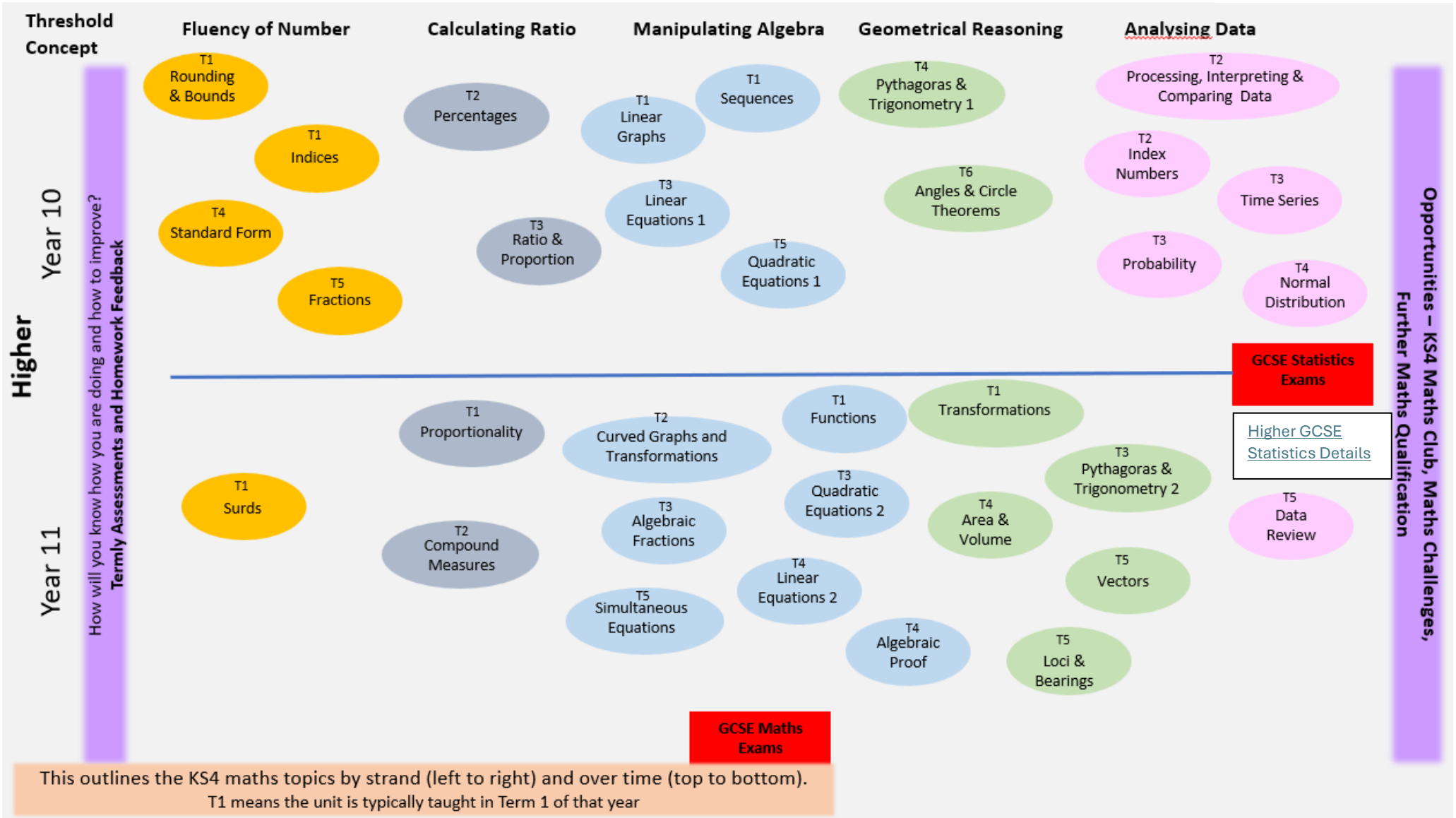
GCSE Maths Higher – Click the topics for details



This outlines the KS4 maths topics by strand (left to right) and over time (top to bottom).
T1 means the unit is typically taught in Term 1 of that year

Reminder of how to access Sparx independent learning

Rounding and Bounds	Sparx Codes:
• Round numbers to a given power of 10 and to the nearest integer, number of decimal places, to a given number of significant figures. • Use rounding to estimate answers to calculations • Use inequality notation to specify simple error intervals due to truncation or rounding • Estimate powers and roots of any given positive number. • Find reciprocals • Calculate the lower and upper bounds • Find the lower and upper bounds of calculations such as perimeter, area, volume and speed. • Use inequality notation to specify simple error intervals due to truncation or rounding. • Apply and interpret limits of accuracy including upper and lower bounds	U731 U965 U298 U225 U657 U301 U587

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Indices	Sparx Codes:
• Recall integer squares to 15x15 and their corresponding roots • Recall the cubes of 2, 3, 4, 5 and 10. • Recognise powers of 2, 3, 4 and 5 and estimate powers and roots of any given positive number. • Use index notation for squares and cubes and for powers of 10 • Find the value of calculations that include indices • Use index laws to simplify and calculate the value of numerical expressions involving x/÷ of integer and power of a power • Use index laws for negative powers. Recall that $n^0=1$, $n^{-1}=1/n$ for any positive integer • Use index laws for fractional powers, and powers of a power. Recall that $n^{1/2}=\sqrt{n}$ and $n^{1/3}=\sqrt[3]{n}$ for any positive integer	U235 U299 U694 U772 U851 U985

Standard Form	Sparx Codes:
• Writing numbers in standard form; ordering numbers in standard form. • Adding and Subtracting numbers in standard form • Multiplying and dividing numbers in standard form **including worded problems**	U161 U264 U290 U330 U534

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Fractions	Sparx Codes:
• Find equivalent fractions and write a fraction in its simplest form • Comparing and ordering fractions • Convert between mixed numbers and improper fractions • Add, and subtract fractions • Multiply and divide fractions • Find a fraction of a quantity and link to percentage of a quantity • Convert between fractions, decimals and percentages. • Ordering fractions, decimals and percentages. Use of inequality signs. • Recognise that recurring decimals are exact fractions, and that some exact fractions are recurring decimals and convert between them • Add, Subtract, Multiply and Divide algebraic fractions	U704 U646 U736 U176 U692 U793 U439 U475 U224 U544 U538 U874 U550 U689 U881 U916

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Surds	Sparx Codes:
• Simplifying surds • Know and use the rules for addition and subtraction in expressions containing surds • Know and use the rules for multiplication and division in expressions containing surds • Expand and simplify expressions involving surds e.g. write $2(3-\sqrt{3})$ in the form $a+b\sqrt{3}$ • Rationalise a denominator	U633 U338 U872 U499 U707 U281

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Percentages	Sparx Codes:
• Percentage of an amount including using a calculator and working with percentages greater than 100% • Calculate percentage increase and decrease with and without a calculator • Writing one number as a percentage of another, including over 100% and calculating percentage profit and loss. • Calculate simple interest • Reverse percentages • **C**ompound interest, including depreciation, growth and decay including using the formula & problems involving repeated % change. • Problem solving using percentages	U278 U286 U349 U554 U671 U773 U925

Ratio and Proportion	Sparx Codes:
• Write ratios in their simplest form, 1 : n and n : 1 • Divide a quantity into a given ratio. • Solve a ratio problem in context, e.g. conversion, comparison, scaling, mixing and concentrations. • Calculate an unknown quantity from quantities that vary in direct or inverse proportion. • Relate ratios to fractions and linear functions.	U176 U577 U595 U676 U687 U753 U865 U921

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Proportionality	Sparx Codes:
• Recap proportion using unitary method, including value for money and inverse proportion. Inc graphs. • Interpret the gradient of a straight-line graph as a rate of change, **recognise and interpret graphs that illustrate direct and inverse proportion** • **D**irect proportion using algebraic functions e.g. $y \propto x^2$ as $y = kx^2$ including a graphical representation. • Indirect proportion, using algebraic functions, e.g. $y \propto 1/x^2$ as $y = k/x^2$ including a graphical representation.	U721 U357 U238 U610 U407 U364 U138 U640

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Compound Measures	Sparx Codes:
• Make sensible estimates of a range of measures. • Speed, Distance and Time calculations • Distance – Time Graphs • Real life graphs • Rates of change (finding the gradient of the tangent to a curve) • Pressure and Density • **Velocity –** Time Graphs and Interpreting velocity-time graphs. Estimating the area under a curve using trapezia • Calculate or estimate gradients of graphs and areas under graphs and interpret results. • Interpret the gradient at a point on a curve as the instantaneous rate of change. • Velocity and acceleration	U462 U966 U151 U527 U842 U910 U403 U914 U937 U562 U611 U800

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Sequences	Sparx Codes:
• Identify triangular, quadratic, cubic, Fibonacci, and geometric sequences. • Generate sequences of numbers, squared integers and sequences derived from diagrams • Write the term-to-term definition of a sequence in words and find terms using these • Generate sequences using term to term and position to term definitions of the sequence. • Use and be able to find the n^{th} term of an arithmetic sequence • Use and be able to find the n^{th} term of an quadratic sequence • Identify which terms cannot be in a sequence • Use and be able to find the n^{th} term of a geometric sequence	U213 U530 U498 U978 U206 U680 U958 U171

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Linear Graphs	Sparx Codes:
• Plotting coordinates in all four quadrants • Plotting graphs of the form x = a, y = b, y=mx+c and ax + by = c • Finding the gradient and y-intercept from a linear equation and a graph. • Find the equation of a line from coordinates • Equations of parallel and perpendicular lines. Also rearrange equations into the form y = mx + c • Solving linear simultaneous equations graphically.	U789 U933 U889 U741 U315 U669 U477 U848 U377 U898 U836

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Linear Equations 1	Sparx Codes:
• Set up simple equations. • Rearrange simple equations. • Solve one-step and two-step equations, including fractional and negative answers and coefficients. • Solve linear equations with unknowns on both sides involving integer or fractional coefficients. • Solve linear equations which contain brackets. • Know the difference between an equation and an identity. Argue mathematically to show algebraic expressions are equivalent and use algebra to support and construct arguments and proofs. • Solve simple linear inequalities in one variable, and represent the solution set on a number line. • Show the solution set of inequalities on a graph. • Find the exact solution of two simultaneous equations in two unknowns by using an elimination approach. • Solve simultaneous equations by substitution.	U755 U325 U870 U505 U599 U509 U759 U738 U145 U337 U747 U133 U760 U836 U137

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Quadratic Equations 1	Sparx Codes:
• Generate points and plot graphs of simple quadratic functions. • Solve Quadratic Graphs graphically and Draw Cubic graphs. • Identify and interpret roots, intercepts and turning points of quadratic functions. • Solve simple quadratic equations by factorisation. • Solve quadratic equations by using the quadratic formula and completing the square. • Factorise and Solve Quadratic Equations in the form ax^2 + bx + c where a > 1	U178 U858 U963 U228 U960 U665 U601 U150 U989 U667 U769

Functions	Sparx Codes:
• Substituting numbers into functions and a sequence of functions • Interpret expressions as functions with inputs and outputs • Finding the inverse of a function and writing as $f^{-1}(x)$. • Interpret the reverse process as the 'inverse function' • Composite functions – substituting values into successive functions including understanding fg(x) notation • Substituting an algebraic term into a function	U637 U895 U448 U996

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Curved Graphs & Transformations	Sparx codes:
• Recap finding the equation of a straight line • Plot and recognise graphs of simple cubic functions, the reciprocal function, the exponential function and the trigonometric functions. • Construct a circle with equations $x^2+y^2=r^2$ centred at the origin. • Find graphically the intersection of points of a given straight line with this circle. • Find equation of a tangent to a circle at a given point. • Given f(x), investigate the transformation applied for the graphs of f(x+a), f(x)+a and –f(x) or f(-x) • Finding the maximum or minimum after a transformation. • Sketch translations and reflections of a given function.	U315 U669 U477 U848 U898 U567 U598 U487 U455

Quadratic Equations 2	Sparx Codes:
• Expanding products of two or more binomials • Solve simple quadratic equations by factorisation. • Solve simple quadratic equations by using the quadratic formula and completing the square. • Deduce roots algebraically and turning points by completing the square. • Find approximate solutions to equations numerically using iteration. • Able to show that the solution lies between two values • Able to rearrange an equation into an iterative formula	U769 U178 U858 U963 U397 U228 U960 U598 U665

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Algebraic Fractions	Sparx Codes:
• Simplifying algebraic fractions including factorising certain expressions. • Simplify and manipulate algebraic expressions, including those involving surds and algebraic fractions. • Add, subtract, multiply and divide algebraic fractions • Solve equations with algebraic fractions	U103 U437 U294 U685 U457 U824

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Linear Equations 2	Sparx Codes:
• Recap solving equations and algebraic fractions. • Recap solving linear inequalities graphically • Identifying the region that satisfies two or more linear inequalities. • Solve simple linear inequalities in one or two variables, and represent the solution set on a number line. • Solve quadratic inequalities in one variable. • Show the solution set of inequalities on a graph on a number line and **using set notation**. • Rearrange simple and complex formulae, including factorising.	U755 U325 U870 U505 U599 U509 U759 U738 U145 U337 U747 U133 U760 U836 U137 U675 U181 U191

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Simultaneous Equations	Sparx Codes:
• Find the exact solution of two simultaneous equations in two unknowns by using an elimination or substitution approach. • Interpret a pair of simultaneous equations as a pair of straight lines and their solution as the point of intersection on a graph. • Find the exact solution of two simultaneous equations with one linear and one quadratic. • Finding the graphical solution of a linear and quadratic simultaneous equation	U760 U757 U547 U836 U875 U137 U269

Algebraic Proof	Sparx Codes:
• Know the difference between an equation and an identity. • Use algebra to argue algebraic expressions are equivalent. • Prove algebraically - Statements involving even and odd numbers. - Divisibility - Geometric identities	U582

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Pythagoras & Trigonometry 1	Sparx Codes:
• Finding a missing length of a right-angled triangle using Pythagoras' • Finding a missing length or angle of a right-angled triangle using Trigonometry. • Understand the language of planes, and recognise the diagonals of a cuboid, including finding the length of the diagonals • Find the angle between a line and a plane • Bearings and scale drawings. Use three-figure bearings to specify direction. • Map scales and bearings. • 3D Pythagoras and Trigonometry.	U385 U828 U525 U107 U605 U283 U545 U164 U541 U170

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Angles & Circle Theorems	Sparx Codes:
• Recap basic angle rules. • Angles in parallel lines including algebraic angles, triangles and quadrilterals. • Interior and exterior angles of regular and irregular polygons, deduce and use angle sum in any polygon and derive properties of regular polygons • Identify and apply circle definitions and properties, including centre, radius, chord, diameter, circumference, tangent, arc, sector and segment • Circle Theorems: • The radius and tangent are perpendicular • Two tangents that meet at a point are equal. • The angle in a semi-circle is a right-angle. • Angle at centre is twice that of the angle at the circumference. • Angles in the same segment are equal • Opposite angles in a cyclic quadrilateral add to 180^o • Alternate segment theorem • Proofs	U390 U730 U628 U732 U655 U826 U329 U427 U459 U251 U489 U130 U808 U807

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Transformations, Similarity and Congruency	Sparx Codes:
• Recap translation, rotation and reflection including describing the transformation. • Enlargement by a positive and by a negative scale factor. Describing the enlargement. • Combined transformations • Using scale factors to find missing lengths in similar shapes. • Using scale factors to find missing areas and volumes in similar shapes. • Convert between metric area and volume units. • Congruent triangles. Using the uniqueness of SSS, SAS, ASA and RHS to prove triangles are congruence/similarity.	U196 U799 U696 U519 U134 U766 U551 U866 U578 U630 U110

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Pythagoras & Trigonometry 2	Sparx Codes:
• Understand, recall and use Pythagoras' Theorem in 2-D and 3-D problems. • Understand, recall and use trigonometry in 2-D and 3-D problems. • Exact trigonometric values and know the trigonometric graphs. • Calculate the area of a triangle given the length of two sides and the included angle. • Know and apply the sine rule • Know and apply the cosine rule	U385 U828 U525 U107 U605 U283 U545 U164 U170 U541 U952 U591 U592 U164

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Area & Volume	Sparx codes:	
• Circumference and arc length • Area of Circles and area of sectors • Recap volume and surface area of prisms • Find the volume and surface area of a cylinder. • Find the surface area and volume of compound shapes constructed from cubes, cuboids, cones, pyramids, spheres and cylinders. • Volume of a frustum	U604 U950 U221 U251 U373 U459 U786 U174 U484 U915 U116 U617 U426	U350 U543 U929 U259 U871 U142 U464 U523 U893 U771 U334 U561

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Vectors	Sparx Codes:
• Understand and use vector notation. • Calculate, and represent graphically, the sum of two vectors, the difference of two vectors and a scalar multiple of a vector. • Calculate the resultant of two vectors. • Solve geometrical problems in 2-D using vectors. • Use vectors to construct geometric arguments and proofs.	U632 U903 U564 U781 U660

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Construction	Sparx Codes:
• Construct SSS, SAS and ASA type triangles from given information. • Find and describe regions satisfying a combination of loci (restricted to two dimensions only). • Construction: perpendicular bisector of a given line perpendicular from a point to a line bisector of an angle. 30^0, 45^0 and 60^0 angles • Draw and construct diagrams from given instructions. • Know that the perpendicular distance is the shortest distance • Know how to use a compass to work out bearings to 3 figures. • Be able to work out bearings using angles on parallel lines.	U187 U787 U245 U979 U820 U525 U107

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Representing, Interpreting and Comparing Data	Sparx Codes:
• Draw and interpret cumulative frequency step polygons for discrete data • Draw and interpret cumulative frequency diagrams for grouped data • Calculate percentiles • Calculate the interpercentile range and interdecile range. • Draw and interpret Boxplots and be able to calculate the range and inter-quartile range from the graphs or data. • Calculate and use frequency density to draw histograms with unequal class widths. • Interpret and compare data sets displayed in histograms with unequal class widths. • Be able to estimate the median of a Histogram • Identify the type of skew from certain graphs • Use a formula to calculate the value of the skew from specific data..	U840 U182 U642 U879 U837 U507 U185 U814 U983 U267

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Time Series	Sparx Codes:

• Draw and interpret line graphs and time series graphs.
  • Be able to calculate moving averages (3, 4 or more point moving averages).
• Draw trend lines through moving averages.
  • Identify general trends and explain this by using seasonal variation on a time series graph (e.g. patterns that occur during the week, or patterns that occur during each quarter of the year)
  • Know that the predicted value = trend line + seasonal variation
• Calculate the estimated mean seasonal variation
	No Sparx Codes

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Index Numbers	Sparx Codes:
• Calculate the geometric mean for a data set • Calculate a weighted mean for a data set • Calculate and interpret simple index numbers; • Calculate and interpret chain-based index numbers; • Have an understanding of the retail price index (RPI), consumer price index (CPI) and gross domestic product (GDP) and other index numbers in context; • Calculate and interpret rates of change over time including, but not limited to, births, deaths, house prices, unemployment and percentage change. • Calculate and interpret rates of change over time from tables using context specific formula. E.g. Standardised Birth Rates. • Calculated weighted index numbers	No Sparx Codes

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Probability	Sparx Codes:
• Recap - Theoretical Probability / Sample space / relative frequency. • Use sample space diagrams to calculate probabilities • Create tree diagrams and calculate probabilities for independent and conditional events. • Determine and interpret relative risk and absolute risk • Use Venn diagrams and set notation for probabilities. • Use Two-way tables to calculate probabilities. • Use the formula for conditional probability • Binomial distributions and calculating probabilities, including understanding the notation.	U104 U476 U748 U296 U558 U729 U580 U699 U821 U806

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Normal Distributions	Sparx Codes:
• Calculate the standard deviation of a set of discrete data • Calculate an estimate of the standard deviation of a set of grouped data. • Know the conditions for a normal distribution to be a suitable model • Understand the notation (μ, σ^2). • Know the shape and percentages of a normal distribution curve and how it occurs. • Determine skewness from data by inspection • Determine skewness from data by calculation • Identify outliers by inspection and by calculation • Use standardised scores to compare two samples of data • Understand the process of quality assurance and why it is necessary in the real world. Including warning and action limits.	No Sparx Codes.

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