

# KS4 Foundation Tier Curriculum Map

FOUNDATION TIER	
Year 10	Year 11
GCSE (9-1) Foundation	GCSE (9-1) Foundation
Unit 1 Number	Unit 16 Quadratic equations and graphs
Unit 2 Algebra	Unit 17 Perimeter, area and volume 2
Unit 3 Graphs, tables and charts	Unit 18 Fractions, indices and standard form
Unit 4 Fractions and percentages	Unit 19 Congruence, similarity and vectors
Unit 5 Equations, inequalities and sequences	Unit 20 More algebra
Unit 6 Angles	
Unit 7 Averages and range	
Unit 8 Perimeter, area and volume 1	
Unit 9 Graphs	
Unit 10 Transformations	
Unit 11 Ratio and proportion	
Unit 12 Right-angled triangles	
Unit 13 Probability	
Unit 14 Multiplicative reasoning	
Unit 15 Constructions, loci and bearings	

<b>YEAR 10</b>		<b>Edexcel GCSE (9-1) Mathematics</b>		<b>Foundation Student Book</b>	
<b>TERM</b>	<b>UNIT / LESSON</b>	<b>HOURS</b>	<b>GCSE (9-1) SPEC REFERENCE</b>		
<b>Key: Italic specification references are assumed prior knowledge and are covered in the prior knowledge check rather than the main teaching.</b>					
<b>AUTUMN</b>	<b>1 Number</b>	11	<i>N1 N2 N3 N4 N5 N6 N7 N13 N14 N15</i>		
<b>AUTUMN</b>	<b>2 Algebra</b>	10	<i>N1 N3 N4 A1 A2 A3 A4 A5 A6 A7 A21</i>		
<b>AUTUMN</b>	<b>3 Graphs, tables and charts</b>	12	<i>G2 G14 G15 S2 S4 S5 S6</i>		
<b>AUTUMN</b>	<b>4 Fractions and percentages</b>	12	<i>N1 N2 N3 N4 N8 N10 N12 N15 R3 R9 S2</i>		
<b>AUTUMN</b>	<b>5 Equations, inequalities and sequences</b>	12	<i>N1 N3 A2 A3 A5 A7 A17 A21 A22 A23 A24 A25</i>		
<b>END OF TERM 1 TEST</b>					
<b>SPRING</b>	<b>6 Angles</b>	9	<i>G1 G3 G4 G6 G7 G11</i>		
<b>SPRING</b>	<b>7 Averages and range</b>	9	<i>S1 S2 S4 S5</i>		
<b>SPRING</b>	<b>8 Perimeter, area and volume 1</b>	10	<i>N13 N14 R1 G12 G14 G16 G17 R1</i>		
<b>SPRING</b>	<b>9 Graphs</b>	10	<i>N13 A7 A8 A9 A10 A12 A14 A17 R11 R14 G14</i>		
<b>SPRING</b>	<b>10 Transformations</b>	10	<i>R6 G1 G7 G24</i>		
<b>END OF TERM 2 TEST</b>					

SUMMER	11 Ratio and proportion	10	N11 N13 R1 R4 R5 R6 R7 R8 R10 R11 R12 R14
SUMMER	12 Right-angled triangles	10	N7 N15 R12 G6 G11 G20 G21
SUMMER	13 Probability	9	N5 P1 P2 P3 P4 P5 P6 P7 P8
SUMMER	14 Multiplicative reasoning	9	N13 R1 R7 R9 R10 R11 R13 R16 G14
SUMMER	15 Constructions, loci and bearings	10	R2 R6 G1 G2 G4 G5 G6 G7 G12 G13 G15
<b>END OF TERM 3 TEST</b>			
<b>END OF YEAR TEST</b>			

<b>YEAR 11</b>		<b>Edexcel GCSE (9-1) Mathematics</b>		<b>Foundation Student Book</b>	
<b>TERM</b>	<b>UNIT / LESSON</b>	<b>HOURS</b>	<b>GCSE (9-1) SPEC REFERENCE</b>		
<b>Key: Italic specification references are assumed prior knowledge and are covered in the prior knowledge check rather than the main teaching.</b>					
<b>AUTUMN</b>	<b>16 Quadratic equations and graphs</b>	11	N4 A1 A3 A4 A6 A8 A11 A12 A14 A18		
<b>AUTUMN</b>	<b>17 Perimeter, area and volume 2</b>	12	N8 N14 N15 N16 G9 G14 G16 G17 G18		
<b>AUTUMN</b>	<b>18 Fractions, indices and standard form</b>	10	N2 N3 N6 N7 N8 N9		
<b>AUTUMN</b>	<b>19 Congruence, similarity and vectors</b>	12	R6 R12 G3 G5 G6 G7 G17 G19 G24 G25		
<b>AUTUMN</b>	<b>20 More algebra</b>	12	A2 A3 A5 A6 A12 A14 A17 A19 A21 R10 R13 R14 R16		
<b>END OF TERM 4 TEST</b>					

REFERENCE	STATEMENT FROM EDEXCEL SPECIFICATION FOR GCSE (9-1) MATHEMATICS
Higher tier students will be assessed on all content.	
Foundation tier students will be assessed on content identified by the standard and underlined type.	
<b>N1</b>	order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥
<b>N2</b>	apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals)
<b>N3</b>	recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals
<b>N4</b>	use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem
<b>N5</b>	apply systematic listing strategies, <b>including use of the product rule for counting (i.e. if there are m ways of doing one task and for each of these, there are n ways of doing another task, then the total number of ways the two tasks can be done is <math>m \times n</math> ways)</b>
<b>N6</b>	use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5; <b>estimate powers and roots of any given positive number</b>
<b>N7</b>	<u>calculate with roots, and with integer and fractional indices</u>
<b>N8</b>	calculate exactly with fractions, <u>surds</u> and multiples of $\pi$ ; <b>simplify surd expressions involving squares (e.g. <math>\sqrt{12} = \sqrt{4 \times 3} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}</math>) and rationalise denominators</b>
<b>N9</b>	calculate with and interpret standard form $A \times 10^n$ , where $1 \leq A < 10$ and n is an integer
<b>N10</b>	work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and $\frac{7}{2}$ or 0.375 or $\frac{3}{8}$ ); <b>change recurring decimals into their corresponding fractions and vice versa</b>
<b>N11</b>	identify and work with fractions in ratio problems
<b>N12</b>	interpret fractions and percentages as operators

<b>N13</b>	use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate
<b>N14</b>	estimate answers; check calculations using approximation and estimation, including answers obtained using technology
<b>N15</b>	round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); <u>use inequality notation to specify simple error intervals due to truncation or rounding</u>
<b>N16</b>	<u>apply and interpret limits of accuracy, including upper and lower bounds</u>
<b>A1</b>	use and interpret algebraic manipulation, including: <ul style="list-style-type: none"> <li>● <math>ab</math> in place of <math>a \times b</math></li> <li>● <math>3y</math> in place of <math>y + y + y</math> and <math>3 \times y</math></li> <li>● <math>a^2</math> in place of <math>a \times a</math>, <math>a^3</math> in place of <math>a \times a \times a</math>, <math>a^2b</math> in place of <math>a \times a \times b</math></li> <li>● <math>a/b</math> in place of <math>a \div b</math></li> <li>● coefficients written as fractions rather than as decimals</li> <li>● brackets</li> </ul>
<b>A2</b>	substitute numerical values into formulae and expressions, including scientific formulae
<b>A3</b>	understand and use the concepts and vocabulary of expressions, equations, formulae, <u>identities</u> , inequalities, terms and factors
<b>A4</b>	simplify and manipulate algebraic expressions ( <u>including those involving surds and algebraic fractions</u> ) by: <ul style="list-style-type: none"> <li>● collecting like terms</li> <li>● multiplying a single term over a bracket</li> <li>● taking out common factors</li> <li>● <u>expanding products of two or more binomials</u></li> <li>● <u>factorising quadratic expressions of the form <math>x^2 + bx + c</math>, including the difference of two squares; factorising quadratic expressions of the form <math>ax^2 + bx + c</math></u></li> <li>● simplifying expressions involving sums, products and powers, including the laws of indices</li> </ul>
<b>A5</b>	understand and use standard mathematical formulae; rearrange formulae to change the subject
<b>A6</b>	<u>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</u>

<b>A7</b>	where appropriate, interpret simple expressions as functions with inputs and outputs; ; <b>interpret the reverse process as the 'inverse function'; interpret the succession of two functions as a 'composite function' (the use of formal function notation is expected)</b>
<b>A8</b>	work with coordinates in all four quadrants
<b>A9</b>	plot graphs of equations that correspond to straight-line graphs in the coordinate plane; <u>use the form <math>y = mx + c</math> to identify parallel and perpendicular lines</u> ; find the equation of the line through two given points or through one point with a given gradient
<b>A10</b>	identify and interpret gradients and intercepts of linear functions graphically and algebraically
<b>A11</b>	<u>identify and interpret roots, intercepts, turning points of quadratic functions graphically</u> ; deduce roots algebraically <b>and turning points by completing the square</b>
<b>A12</b>	recognise, sketch and interpret graphs of linear functions, quadratic functions, <u>simple cubic functions, the reciprocal function <math>y = 1/x</math> with <math>x \neq 0</math>, exponential functions <math>y = k^x</math> for positive values of <math>k</math>, and the trigonometric functions (with arguments in degrees) <math>y = \sin x</math>, <math>y = \cos x</math> and <math>y = \tan x</math> for angles of any size</u>
<b>A13</b>	<b>sketch translations and reflections of a given function</b>
<b>A14</b>	plot and interpret graphs ( <u>including reciprocal graphs and exponential graphs</u> ) and graphs of non-standard functions in real contexts to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration
<b>A15</b>	<b>calculate or estimate gradients of graphs and areas under graphs (including quadratic and other non-linear graphs), and interpret results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts (this does not include calculus)</b>
<b>A16</b>	<b>recognise and use the equation of a circle with centre at the origin; find the equation of a tangent to a circle at a given point</b>
<b>A17</b>	solve linear equations in one unknown algebraically ( <u>including those with the unknown on both sides of the equation</u> ); find approximate solutions using a graph
<b>A18</b>	<u>solve quadratic equations (including those that require rearrangement) algebraically by factorising, by completing the square and by using the quadratic formula</u> ; find approximate solutions using a graph
<b>A19</b>	<u>solve two simultaneous equations in two variables (linear/linear or linear/quadratic) algebraically</u> ; find approximate solutions using a graph
<b>A20</b>	<b>find approximate solutions to equations numerically using iteration</b>

<b>A21</b>	translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution
<b>A22</b>	solve linear inequalities in one or two variable(s), and quadratic inequalities in one variable; represent the solution set on a number line, using set notation and on a graph
<b>A23</b>	generate terms of a sequence from either a term-to-term or a position-to-term rule
<b>A24</b>	recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions ( $r^n$ where $n$ is an integer, and $r$ is a rational number $> 0$ or a surd) and other sequences
<b>A25</b>	deduce expressions to calculate the $n$ th term of linear and quadratic sequences
<b>R1</b>	change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts
<b>R2</b>	use scale factors, scale diagrams and maps
<b>R3</b>	express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1
<b>R4</b>	use ratio notation, including reduction to simplest form
<b>R5</b>	divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)
<b>R6</b>	express a multiplicative relationship between two quantities as a ratio or a fraction
<b>R7</b>	understand and use proportion as equality of ratios
<b>R8</b>	relate ratios to fractions and to linear functions
<b>R9</b>	define percentage as 'number of parts per hundred'; interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase/decrease and original value problems, and simple interest including in financial mathematics
<b>R10</b>	solve problems involving direct and inverse proportion, including graphical and algebraic representations
<b>R11</b>	use compound units such as speed, rates of pay, unit pricing, density and pressure
<b>R12</b>	compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors

<b>R13</b>	<u>understand that X is inversely proportional to Y is equivalent to X is proportional to 1/Y; <b>construct and interpret</b> equations that describe direct and inverse proportion</u>
<b>R14</b>	<u>interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion</u>
<b>R15</b>	<b>interpret the gradient at a point on a curve as the instantaneous rate of change; apply the concepts of average and instantaneous rate of change (gradients of chords and tangents) in numerical, algebraic and graphical contexts (this does not include calculus)</b>
<b>R16</b>	<u>set up, solve and interpret the answers in growth and decay problems, including compound interest <b>and work with general iterative processes</b></u>
<b>G1</b>	use conventional terms and notation: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written description
<b>G2</b>	<u>use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); use these to construct given figures and solve loci problems; know that the perpendicular distance from a point to a line is the shortest distance to the line</u>
<b>G3</b>	apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons)
<b>G4</b>	derive and apply the properties and definitions of special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language
<b>G5</b>	<u>use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS)</u>
<b>G6</b>	<u>apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs</u>
<b>G7</b>	identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including <u>fractional and negative scale factors</u> )
<b>G8</b>	<b>describe the changes and invariance achieved by combinations of rotations, reflections and translations</b>
<b>G9</b>	identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, <u>tangent, arc, sector and segment</u>

<b>G10</b>	<b>apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results</b>
<b>G11</b>	solve geometrical problems on coordinate axes
<b>G12</b>	identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres
<b>G13</b>	<u>construct and interpret plans and elevations of 3D shapes</u>
<b>G14</b>	use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)
<b>G15</b>	measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings
<b>G16</b>	know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)
<b>G17</b>	know the formulae: circumference of a circle = $2\pi r = \pi d$ , area of a circle = $\pi r^2$ ; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; <u>surface area and volume of spheres, pyramids, cones and composite solids</u>
<b>G18</b>	<u>calculate arc lengths, angles and areas of sectors of circles</u>
<b>G19</b>	<u>apply the concepts of congruence and similarity, including the relationships between lengths, areas and volumes in similar figures</u>
<b>G20</b>	know the formulae for: Pythagoras' theorem $a^2 + b^2 = c^2$ , and the trigonometric ratios, $\sin \theta = \text{opposite/hypotenuse}$ , $\cos \theta = \text{adjacent/hypotenuse}$ and $\tan \theta = \text{opposite/adjacent}$ apply them to find angles and lengths in right-angled triangles <b>and, where possible, general triangles in two and three dimensional figures</b>
<b>G21</b>	know the exact values of $\sin \theta$ and $\cos \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and $90^\circ$ ; know the exact value of $\tan \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and $60^\circ$
<b>G22</b>	<b>know and apply the sine rule <math>a/\sin A = b/\sin B = c/\sin C</math>, and cosine rule <math>a^2 = b^2 + c^2 - 2bc \cos A</math>, to find unknown lengths and angles</b>
<b>G23</b>	<b>know and apply <math>\text{Area} = 1/2 ab \sin C</math> to calculate the area, sides or angles of any triangle</b>
<b>G24</b>	describe translations as 2D vectors
<b>G25</b>	<u>apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; use vectors to construct geometric arguments and proofs</u>
<b>P1</b>	record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees

P2	apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments
P3	relate relative expected frequencies to theoretical probability, using appropriate language and the 0-1 probability scale
P4	apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one
P5	<u>understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size</u>
P6	enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams <u>and tree diagrams</u>
P7	construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities
P8	<u>calculate the probability of independent and ependent combined events, including using tree diagrams and other representations, and know the underlying assumptions</u>
P9	<b>calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams</b>
S1	<u>infer properties of populations or distributions from a sample, while knowing the limitations of sampling</u>
S2	interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, <u>tables and line graphs for time series data</u> and know their appropriate use
S3	<b>construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use</b>
S4	interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: <ul style="list-style-type: none"> <li>• appropriate graphical representation involving discrete, continuous and grouped data, <b>including box plots</b></li> <li>• appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers, <b>quartiles and inter-quartile range</b>)</li> </ul>
S5	apply statistics to describe a population
S6	use and interpret scatter graphs of bivariate data; recognise correlation <u>and know that it does not indicate causation;</u> <u>draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends while knowing the dangers of so doing</u>