

Maths Higher Only

	Skills / Knowledge	Yr7	Yr8	Yr9	Yr10	Yr11	
A01/A02/A03	N5 - including use of the product rule for counting		Y	Y	Y	Y	
	N6 - estimate powers and roots of any given positive number	Y	Y	Y	Y	Y	
	N7		Y	Y	Y	Y	
	N8 - calculate exactly with surds simplify surd expressions involving squares (eg $\sqrt{12}=\sqrt{4\times 3}=\sqrt{4}\times\sqrt{3}=2\sqrt{3}$) and rationalise denominators				Y	Y	Y
	N16 - including upper and lower bounds			Y	Y	Y	
	A4 - simplify and manipulate algebraic expressions (including those involving surds and algebraic fractions) by: expanding products of two or more binomials factorising quadratic expressions of the form ax^2+bx+c				Y	Y	
	A6 - to include proofs				Y	Y	
	A7 - interpret the reverse process as the 'inverse function' interpret the succession of two functions as a 'composite function'				Y	Y	
	A9 - use the form $y=mx+c$ to identify perpendicular lines		Y	Y	Y	Y	
	A11 - deduce turning points by completing the square			Y	Y	Y	
	A12 - including exponential functions $y=k^x$ for positive values of k, and the trigonometric functions (with arguments in degrees) $y=\sin x$, $y=\cos x$ and $y=\tan x$ for angles of any size				Y	Y	
	A13 - sketch translations and reflections of a given function				Y	Y	
	A14 - including exponential graphs				Y	Y	
	A15 - 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				Y	Y	
	A16 -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					Y	
	A18 - including those that require rearrangement including completing the square and by using the quadratic formula				Y	Y	
	A19 - including linear/quadratic				Y	Y	
	A20 - find approximate solutions to equations numerically using iteration				Y	Y	
	A22 - 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				Y	Y	
	A24 - including other sequences including where r is a surd				Y	Y	
	A25 - including quadratic sequences			Y	Y	Y	
	R13 - construct and interpret equations that describe direct and inverse proportion`				Y	Y	

A	R15 - 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				Y	Y
	R16 - and work with general iterative processes				Y	Y
	G7 - including negative scale factors			Y	Y	Y
	G8 - describe the changes and invariance achieved by combinations of rotations, reflections and translations			Y	Y	Y
	G10 - apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results			Y	Y	Y
	G19 - including the relationships between lengths, areas and volumes in similar figures			Y	Y	Y
	G20 - apply them to find angles and lengths in right-angled triangles and, where possible, general triangles in two and three dimensional figures			Y	Y	Y
	G22 - know and apply the sine rule, $\frac{a}{\sin A}$ $=$ $\frac{b}{\sin B}$ $=$ $\frac{c}{\sin C}$ <p>and cosine rule, $a^2 = b^2 + c^2 - 2bc \cos A$ to find unknown lengths and angles</p>					
	G23 - know and apply					
	Area = $\frac{1}{2} \times ab \sin C$ to calculate the area, sides or angles of any triangle				Y	Y
	G25 - use vectors to construct geometric arguments and proofs				Y	Y
	P9 - calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams	Y		Y	Y	Y
	S3 - construct and interpret diagrams for grouped discrete data and continuous data, ie histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use			Y	Y	Y
S4 - including box plots - including quartiles and inter-quartile range			Y	Y	Y	

Maths

Skills / Knowledge	Yr7	Yr8	Yr9	Yr10	Yr11
N1 - order positive and negative integers, decimals and fractions use the symbols =, ≠, <, >, ≤, ≥	Y	Y	Y	Y	Y
N2 - 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 (eg when working with very large or very small numbers, and when calculating with decimals)	Y	Y	Y	Y	Y
N3 - recognise and use relationships between operations, including inverse operations (eg cancellation to simplify calculations and expressions) use conventional notation for priority of operations, including brackets, powers, roots and reciprocals	Y	Y	Y	Y	Y
N4 - 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	Y	Y	Y	Y	Y
N5 - apply systematic listing strategies	Y	Y	Y	Y	Y
N6 - use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5	Y	Y	Y	Y	Y
N7 - calculate with roots, and with integer indices	Y	Y	Y	Y	Y
N8 - calculate exactly with fractions	Y	Y	Y	Y	Y
N8 - calculate exactly with multiples of π	Y	Y	Y	Y	Y
N9 - calculate with and interpret standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer	Y	Y	Y	Y	Y
N10 - work interchangeably with terminating decimals and their corresponding fractions such as 3.5 and $\frac{7}{2}$ or 0.375 and $\frac{3}{8}$	Y	Y	Y	Y	Y
N11 - identify and work with fractions in ratio problems		Y	Y	Y	Y
N12 - interpret fractions and percentages as operators	Y	Y	Y	Y	Y
N13 - use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate	Y	Y	Y	Y	Y
N14 - estimate answers check calculations using approximation and estimation, including answers obtained using technology	Y	Y	Y	Y	Y
N15 - round numbers and measures to an appropriate degree of accuracy (eg to a specified number of decimal places or significant figures)	Y	Y	Y	Y	Y
N15 - use inequality notation to specify simple error intervals due to truncation or rounding	Y	Y	Y	Y	Y
N16 - apply and interpret limits of accuracy			Y	Y	Y
A1 - use and interpret algebraic notation, including: ab in place of $a \times b$ $3y$ in place of $y+y+y$ and $3xy$ a^2 in place of $a \times a$, a^3 in place of $a \times a \times a$, a^2b in place of $a \times a \times b$ $\frac{a}{b}$ in place of $a \div b$ coefficients written as fractions rather than as decimals brackets	Y	Y	Y	Y	Y
A2 - substitute numerical values into formulae and expressions, including scientific formulae	Y	Y	Y	Y	Y
A3 - understand and use the concepts and vocabulary of expressions, equations, formulae, inequalities, terms and factors	Y	Y	Y	Y	Y
A3 - to include identities	Y	Y	Y	Y	Y

A4 - simplify and manipulate algebraic expressions by: collecting like terms, multiplying a single term over a bracket, taking out common factors, simplifying expressions involving sums, products and powers, including the laws of indices	Y	Y	Y	Y	Y
A4 - simplify and manipulate algebraic expressions (including those involving surds) by: expanding products of two binomials factorising quadratic expressions of the form x^2+bx+c , including the difference of two squares	Y	Y	Y	Y	Y
A5 - understand and use standard mathematical formulae					
rearrange formulae to change the subject			Y	Y	Y
A6 - 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			Y	Y	Y
A7 - where appropriate, interpret simple expressions as functions with inputs and outputs	Y	Y	Y	Y	Y
A8 - work with coordinates in all four quadrants		Y	Y	Y	Y
A9 - plot graphs of equations that correspond to straight-line graphs in the coordinate plane		Y	Y	Y	Y
A9 - use the form $y=mx+c$ to identify parallel lines					
find the equation of the line through two given points, or through one point with a given gradient		Y	Y	Y	Y
A10 - identify and interpret gradients and intercepts of linear functions graphically and algebraically		Y	Y	Y	Y
A11 - identify and interpret roots, intercepts and turning points of quadratic functions graphically					
□ deduce roots algebraically				Y	Y
A12 - recognise, sketch and interpret graphs of linear functions and quadratic functions				Y	Y
A12 - including simple cubic functions and the reciprocal function $y=\frac{1}{x}$ with $x \neq 0$				Y	Y
A13 -					
A14 - plot and interpret graphs, 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				Y	Y
A14 - including reciprocal graphs				Y	Y
A15 -					
A16 -					
A17 - solve linear equations in one unknown algebraically					
find approximate solutions using a graph	Y	Y	Y	Y	Y
A17 - including those with the unknown on both sides of the equation	Y	Y	Y	Y	Y
A18 - solve quadratic equations algebraically by factorising / find approximate solutions using a graph		Y	Y	Y	Y
A19 - solve two simultaneous equations in two variables (linear/linear) algebraically					
find approximate solutions using a graph			Y	Y	Y
A20 -					
A21 - 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	Y	Y	Y	Y	Y
A22 - solve linear inequalities in one variable, represent the solution set on a number line		Y	Y	Y	Y
A23 - generate terms of a sequence from either a term-to-term or a position-to-term rule	Y	Y	Y	Y	Y
A24 - recognise and use sequences of triangular, square and cube numbers and simple arithmetic progressions		Y	Y	Y	Y

Additional Foundation Content

Higher only

A24 - including Fibonacci-type sequences, quadratic sequences, and simple geometric progressions (r^n where n is an integer and r is a rational number > 0)	Y	Y	Y	Y	Y
A25 - deduce expressions to calculate the n th term of linear sequences		Y	Y	Y	Y
R1 - change freely between related standard units (eg time, length, area, volume/capacity, mass) and compound units (eg speed, rates of pay, prices) in numerical contexts	Y	Y	Y	Y	Y
R1 - compound units (eg density, pressure) in numerical and algebraic contexts	Y	Y	Y	Y	Y
R2 - use scale factors, scale diagrams and maps		Y	Y	Y	Y
R3 - express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1		Y	Y	Y	Y
R4 - use ratio notation, including reduction to simplest form		Y	Y	Y	Y
R5 - 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)		Y	Y	Y	Y
R6 - express a multiplicative relationship between two quantities as a ratio or a fraction		Y	Y	Y	Y
R7 - understand and use proportion as equality of ratios		Y	Y	Y	Y
R8 - relate ratios to fractions and to linear functions			Y	Y	Y
recognise '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		Y	Y	Y	Y
R10 - solve problems involving direct and inverse proportion, including graphical and algebraic representations				Y	Y
R11 - use compound units such as speed, rates of pay, unit pricing			Y	Y	Y
R11 - use compound units such as density and pressure			Y	Y	Y
R12 - compare lengths, areas and volumes using ratio notation					
scale factors				Y	Y
R12 - make links to similarity (including trigonometric ratios)				Y	Y
R13 - \square					
understand that X is inversely proportional to Y is equivalent to X is proportional to $\frac{1}{Y}$					
Y interpret equations that describe direct and inverse proportion				Y	Y
R14 - interpret the gradient of a straight-line graph as a rate of change					
recognise and interpret graphs that illustrate direct and inverse proportion			Y	Y	Y
R15					
R16 - set up, solve and interpret the answers in growth and decay problems, including compound interest				Y	Y
G1 - use conventional terms and notations: 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	Y	Y	Y	Y	Y

G2 - 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	Y	Y	Y	Y	Y
G3 - 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 (eg to deduce and use the angle sum in any polygon, and to derive properties of regular polygons)	Y	Y	Y	Y	Y
G4 - 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	Y	Y	Y	Y	Y
G5 - use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS)		Y	Y	Y	Y
G6 - 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		Y	Y	Y	Y
G7 - identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement		Y	Y	Y	Y
G7 - including fractional scale factors			Y	Y	Y
G8					
G9 - identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference	Y	Y	Y	Y	Y
G9 - including: tangent, arc, sector and segment		Y	Y	Y	Y
G10					
G11 - solve geometrical problems on coordinate axes		Y	Y	Y	Y
G12 - identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres			Y	Y	Y
G13 - interpret plans and elevations of 3D shapes			Y	Y	Y
G13 - construct and interpret plans and elevations of 3D shapes			Y	Y	Y
G14 - use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money etc.)	Y	Y	Y	Y	Y
G15 - measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings		Y	Y	Y	Y
G16 - know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)		Y	Y	Y	Y
G17 - know the formulae: circumference of a circle = $2\pi r = \pi d$ area of a circle = πr^2 calculate perimeters of 2D shapes, including circles areas of circles and composite shapes		Y	Y	Y	Y
G17 - surface area and volume of spheres, pyramids, cones and composite solids			Y	Y	Y
G18 - calculate arc lengths, angles and areas of sectors of circles			Y	Y	Y
G19 - apply the concepts of congruence and similarity, including the relationships between lengths in similar figures			Y	Y	Y

