GCSE (9–1) Mathematics (1MA1) and Edexcel Certificate in Mathematics (KMA0): a comparison

GCSE (9–1) Mathematics (1MA1)	**Edexcel Certificate in Mathematics (KMA0)**
Assessment model	*Assessment model*
Externally assessed	Externally assessed
Assessed June and November (NB November is resit and post-16 only)	Assessed January and June
Two tiers: Foundation and Higher (no mixing between tiers)	Two tiers: Foundation and Higher (no mixing between tiers)
Three papers: 1F, 2F and 3F (grades 5–1), or 1H, 2H and 3H (grades 9–4)	Two papers: 1F and 2F (grades C–G), or 3H and 4H (grades A*–D)
Papers 1F and 1H are non-calculator Papers 2F, 3F, 2H and 3H are calculator	Calculators can be used in all papers
Each paper is 1 hour 30 minutes long	Each paper is 2 hours long
Each paper contains 80 marks	Each paper contains 100 marks
Each paper is 33% of the total marks	Each paper is 50% of the total marks
At Higher tier, half of the marks are targeted at grades 4–6 and half at grades 7–9; at Foundation tier, half of the marks are targeted at grades 1–low 3 and half at grades high 3–5	Each paper will have approximately equal marks available for each of the targeted grades
There will be some common questions targeted at grades 4 and 5, across papers 1F/1H, papers 2F/2H, and papers 3F/3H	There will be some common questions targeted at grades C and D, across papers 1F and 3H and papers 2F and 4H The Foundation tier papers contain slightly more number than algebra The Higher tier papers contain considerably more algebra than number
No functional element requirement but the question papers will still contain questions that are set in a real-life context as part of AO3	No functional element requirement but the question papers will still contain questions that are set in a real-life context
Formulae are provided as required within the relevant examination questions.	A formulae sheet is provided at the front of each exam paper.

GCSE (9–1) Mathematics (1MA1)	**Edexcel Certificate in Mathematics (KMA0)**
Assessment objectives and weighting	*Assessment objectives and weighting*
Three Assessment Objectives (weightings in brackets) • AO1 – use and apply standard techniques (50% Foundation; 40% Higher) • AO2 – reason, interpret and communicate mathematically (25% Foundation; 30% Higher) • AO3 – solve problems within mathematics and in other contexts (25% Foundation; 30% Higher)	Three Assessment Objectives (weightings in brackets) • AO1 – demonstrate their knowledge, understanding and skills in number and algebra (55%) • AO2 – demonstrate their knowledge, understanding and skills in shape, space and measures (25%) • AO3 – demonstrate their knowledge, understanding and skills in handling data (20%)
Additional Content	*Additional Content*
Topics included in the GCSE, but **not** included in the IGCSE: • exponential growth • completing the square • gradients of perpendicular lines • exponential functions • translations and reflections of functions • equation of a circle • equation of a tangent to a circle at a given point • areas under graphs • find approximate solutions to equations numerically using iteration • expand more than two binomials • product rule of counting • congruence criteria • proofs of circle theorems • trigonometry graphs • angles greater than 180° • frustum of a cone • construct a perpendicular from a point to a line • loci • negative scale factors • plans and elevations • density and pressure • two-way tables • class interval containing the median • scatter graphs, including lines of best fit • correlation • box plots • stem and leaf diagrams	One major topic included in the IGCSE, but **not** included in the GCSE: • calculus (differentiation only) Two smaller topics included in the IGCSE, but **not** included in the GCSE: • the intersecting chords theorem • modulus of a vector

Switching from the Edexcel Certificate to GCSE Mathematics (9–1): Changes to content

Table 1: New to Foundation

Topics to be assessed at Foundation tier in GCSE Mathematics (9–1) that are Higher tier only in the Edexcel Certificate (KMA0)

1MA1	Topics	KMA0
N4	use the concepts and vocabulary of … highest common factor, lowest common multiple … [S]	**1.4**
N9	calculate with and interpret standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer	**1.9**
A4	factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares [U]	**2.2**
A5	rearrange formulae to change the subject [S]	**2.3**
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 [U]	**3.3**
A12	recognise, sketch and interpret graphs of … simple cubic functions, the reciprocal function $y = 1/x$ with $x \neq 0$ [U]	**3.3**
A18	solve quadratic equations algebraically by factorising; find approximate solutions using a graph [U]	**2.7**
A25	deduce expressions to calculate the nth term of linear sequences [S]	**3.1**
R10	solve problems involving direct and inverse proportion, including graphical and algebraic representations [S]	**2.5**
R12	compare … areas and volumes using ratio notation [S]; …	**4.11**
R13	understand that X is inversely proportional to Y is equivalent to X is proportional to $1/Y$; interpret equations that describe direct and inverse proportion [U]	**2.5**
R14	interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion [U]	**3.4**
G17	know the formulae: … surface area and volume of spheres, … cones … [U]	**3.10**
G18	calculate arc lengths, angles and areas of sectors of circles [U]	**4.9**
G24	describe translations as 2D vectors [S]	**5.2**
G25	apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors [U]	**5.1**
P6	enumerate sets and combinations of sets systematically, using … tree diagrams [U]	**1.5**

1MA1	Topics	KMA0
P8	calculate the probability of … dependent combined events, including using tree diagrams …, and know the underlying assumptions [U]	**6.3**

Table 2: New to both Foundation and Higher tiers

New knowledge, skills and understanding to be assessed at both tiers in GCSE Mathematics (9–1) that were not assessed in the Edexcel Certificate (KMA0)

Knowledge, skills and understanding (1MA1)	
N3	… use conventional notation for priority of operations, including … reciprocals [S]
N15	use inequality notation to specify simple error intervals due to truncation or rounding [U]
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 [U]
A11	identify and interpret roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically [U]
A17	… find approximate solutions to linear equations using a graph [S]
A19	… find approximate solutions to two simultaneous equations in two variables using a graph [U]
A21	… derive … two simultaneous equations … [U]
A24	… Fibonacci type sequences, quadratic sequences, and simple geometric progressions (r^n where n is an integer, and r is a rational number > 0) [U]
R1	change freely between … compound units (e.g. … density, pressure [U]) in numerical [S] and algebraic [U] contexts [S]
R6	express a multiplicative relationship between two quantities as a ratio or a fraction [S]
R11	use compound units such as … density and pressure [U]
R16	set up, solve and interpret the answers in growth and decay problems, including compound interest [U]
G2	… 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]
G5	use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS) [U]
G13	construct [U] and interpret plans and elevations of 3D shapes [S]
G17	know the formulae: … surface area and volume of … pyramids… [U]
G21	know the exact values of sin θ and cos θ for $\theta = 0°, 30°, 45°, 60°$ and 90°; know the exact value of tan θ for $\theta = 0°, 30°, 45°$ and 60° [U]
P1	record … the frequency of outcomes of probability experiments using tables and frequency trees [S]

Knowledge, skills and understanding (1MA1)	
S1	infer properties of populations or distributions from a sample, while knowing the limitations of sampling [U]
S2	interpret and construct … vertical line charts for ungrouped discrete numerical data [S], tables and line graphs for time series data [U] and know their appropriate use [S]
S4	… compare the distributions of data sets from univariate empirical distributions through: • appropriate graphical representation involving discrete, continuous and grouped data, • appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers) [S]
S6	use and interpret scatter graphs of bivariate data; recognise correlation [S] and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends while knowing the dangers of so doing [U]

Key for Table 2:

[S] = standard content [U] = underlined content [B] = bold content

Table 3: New to Higher tier

New knowledge, skills and understanding to be assessed at Higher tier only in GCSE Mathematics (9–1) that were not assessed in the Edexcel Certificate (KMA0)

Knowledge, skills and understanding (1MA1)	
N5	… 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 $m \times n$ ways) [B]
N6	… estimate powers and roots of any given positive number [B]
A4	expanding products of more [than two] binomials [B]
A9	use the form $y = mx + c$ to identify … perpendicular [B] lines
A12	recognise, sketch and interpret the trigonometric functions (with arguments in degrees) $y = \sin x$, $y = \cos x$ and $y = \tan x$ for angles of any size [B]
A13	sketch translations and reflections of a given function [B]
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 [B]
A18	solve quadratic equations … by completing the square … [B]
A20	find approximate solutions to equations numerically using iteration [B]
A22	… represent the solution set … using set notation … [B]
A24	a surd … and other sequences [B]
A25	quadratic sequences [B]
R16	… work with general iterative processes [B]
G7	… negative scale factors) [B]

Key for Table 3:

[S] = standard content [U] = underlined content [B] = bold content

Table 4: Omitted content

Concepts and skills included in the Edexcel Certificate (KMA0) but omitted in GCSE Mathematics (9–1)

Content (KMA0)	Notes
4.3 Symmetry • recognise line and rotational symmetry • identify any lines of symmetry and the order of rotational symmetry of a given two-dimensional figure	*Now part of Key Stage 3*
3.2 Function notation • understand the terms domain and range and which values may need to be excluded from the domain	
3.4 Calculus • understand the concept of a variable rate of change • differentiate integer powers of x • determine gradients, rates of change, turning points (maxima and minima) by differentiation and relate these to graphs • distinguish between maxima and minima by considering the general shape of the graph • apply calculus to linear kinematics and to other simple practical problems	*NB in GCSE Maths (9-1):* *A15: gradient by drawing tangent;* *A11: turning points of quadratic by completing the square*
4.6 Circle properties • understand and use the internal and external intersecting chord properties	
5.1 Vectors • calculate the modulus (magnitude) of a vector	

Table 5: Now Higher tier only

Concepts and skills to be assessed at Higher tier only in GCSE Mathematics (9–1) that are in both tiers in the Edexcel Certificate (KMA0)

Content (KMA0)	
2.8	represent simple linear inequalities on rectangular cartesian graphs
2.8	identify regions on rectangular cartesian graphs defined by simple linear inequalities

Table 6: Omitted but implicit content

Topics included in the Edexcel Certificate (KMA0) that are implicit only in GCSE Mathematics (9–1)

Content (KMA0)	
1.1	understand and use integers (positive, negative and zero) both as positions and translations on a number line
1.11	use a scientific electronic calculator to determine numerical results