Level 2 Further Mathematics / UAS Units

The AQA Level 2 Further Mathematics specification AQA Certificate Mathematics 8365 | Specification has been mapped into Unit Award Scheme units UAS Maths to allow students to be rewarded throughout their L2FM studies. This document shows that mapping.

The units can be completed using your usual L2FM text books and resources as part of your L2FM course, there are no additional resources, tasks or assessments for UAS. The units do not need to be completed in any particular order and, as long as you are registered as a UAS centre, you can apply for UAS certificates whenever your students finish a unit.

Please remember that in order to achieve the L2FM qualification, students must sit the final examinations.

Anything highlighted in Red on the units below will be ‘show knowledge of’ everything else is ‘demonstrate the ability to’

Questions matter

127203 Further Number

1. Number

Ref	Content	Notes
1.1		Knowledge and use of numbers and the number system including fractions, decimals, percentages, ratio, proportion and order of operations are expected
1.2	The product rule for counting	Work out how many 5-digit odd numbers can be formed using the digits 1 3 4 6 8 with no repetition of any digit
1.3	Manipulation of surds, including rationalising the denominator	The use of surds in exact calculations Write $\sqrt{200} - \sqrt{72} + 3\sqrt{162}$ in the form of $a\sqrt{2}$ Rationalise and simplify $\frac{3\sqrt{2}+4}{5\sqrt{2}-7}$ Write the expression $\frac{3\sqrt{3}+7}{3\sqrt{3}-5}$ in the form $a+b\sqrt{3}$, where a and b are integers

Questions matter

127204 Further Algebra (Unit 1)

2. Algebra

Ref	Content	Notes
2.1	The basic processes of algebra	Knowledge and use of basic skills in manipulative algebra including use of the associative, commutative and distributive laws, are expected
2.2	Definition of a function	Notation f (x) will be used, e.g. f $(x) = x^2 - 9$
2.3	Domain and range of a function	Domain may be expressed as, for example, $x > 2$, or 'for all x, except $x = 0$' and range may be expressed as f $(x) > -1$
2.4	Composite functions	The result of two or more functions, say f and g, acting in succession. fg (x) is g followed by f
2.5	Inverse functions	The inverse function of f is written f^{-1} Domains will be chosen for f to make f one-one

Questions matter

127205 Further Algebra (Unit 2)

2.6	Expanding brackets and collecting like terms	Expand and simplify $(y^2 - 2y + 3)(2y - 1) - 2(y^3 - 3y^2 + 4y - 2)$
2.7	Expand $(a + b)^n$ for positive integer n	Expand and simplify $(5x + 2)^3$ Use Pascal's triangle to work out the coefficient of x^3 in the expansion of $(3 + 2x)^5$
2.8	Factorising	Factorise fully $(2x + 3)^2 - (2x - 5)^2$ Factorise $15x^2 - 34xy - 16y^2$ Factorise fully $x^4 - 25x^2$
2.9	Manipulation of rational expressions: Use of $+ \; - \; \times \; \div$ for algebraic fractions with denominators being numeric, linear or quadratic	Simplify $\frac{5}{x+2} - \frac{3}{2x-1}$ Simplify $\frac{x^3 + 2x^2 + x}{x^2 + x}$ Simplify $\frac{5x^2 - 14x - 3}{4x^2 - 25} \div \frac{x - 3}{4x^2 + 10x}$
2.10	Use and manipulation of formulae and expressions	Rearrange $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$ to make v the subject

Questions matter

127205 Further Algebra (Unit 2) continued

2.11	Use of the factor theorem for rational values of the variable for polynomials	Factorise $x^3 - 2x^2 - 5x + 6$ Show that $2x - 3$ is a factor of $2x^3 - x^2 - 7x + 6$ Solve $x^3 + x^2 - 10x + 8 = 0$ Show that $x - 7$ is a factor of $x^5 - 7x^4 - x + 7$
2.12	Completing the square	Work out the values of a, b and c such that $2x^2 + 6x + 7 \equiv a(x + b)^2 + c$

Questions matter

127206 Further Algebra (Unit 3)

2.13	Drawing and sketching of functions Interpretation of graphs	Graphs could be linear, quadratic, exponential and restricted to no more than 3 domains Exponential graphs will be of the form $y = ab^x$ and $y = ab^{-x}$, where a and b are rational numbers Sketch the graph of $y = x^2 - 5x + 6$ Label clearly any points of the intersection with the axes A function f is defined as $f(x) = x^2 \quad 0 \leqslant x < 1$ $= 1 \quad 1 \leqslant x < 2$ $= 3 - x \quad 2 \leqslant x < 3$ Draw the graph of $y = f(x)$ on the grid below for values of x from 0 to 3 Given a sketch of $y = ab^{-x}$, and two points, work out the values of a and b
2.14	Solution of linear and quadratic equations	Solutions of quadratics to include solution by factorisation, by graph, by completing the square or by formula Problems will be set in a variety of contexts, which result in the solution of linear or quadratic equations

Questions matter

127206 Further Algebra (Unit 3) continued

2.15	Algebraic and graphical solution of simultaneous equations in two unknowns, where the equations could both be linear or one linear and one second order	Solve $4x - 3y = 0$ and $6x + 15y = 13$ Solve $y = x + 2$ and $y^2 = 4x + 5$ Solve $y = x^2$ and $y - 5x = 6$ Solve $xy = 8$ and $x + y = 6$
2.16	Algebraic solution of linear equations in three unknowns	Solve $2x - 5y + 4z = 22$ $x + y + 2z = 4$ $x - y - 6z = -4$
2.17	Solution of linear and quadratic inequalities	Solve $5(x - 7) > 2(x + 1)$ Solve $x^2 < 9$ Solve $2x^2 + 5x \leqslant 3$
2.18	Index laws, including fractional and negative indices and the solution of equations	Express as a single power of x $\sqrt{x^{\frac{1}{2}} \times x^{\frac{7}{2}}}$ Express as a single power of x $\sqrt{\frac{x^{\frac{3}{2}} \times x^{\frac{7}{2}}}{x^2}}$ Solve $x^{-\frac{1}{2}} = 3$ Solve $\sqrt{x} - \frac{10}{\sqrt{x}} = 3$ $x > 0$

Questions matter

127207 Further Algebra (Unit 4)

2.19	Algebraic proof	Prove $(n+5)^2 - (n+3)^2$ is divisible by 4 for any integer value of n
2.20	Using nth terms of sequences	Work out the difference between the 16th and 6th terms of the sequence with nth term $\frac{2n}{n+4}$
	Limiting value of a sequence as $n \to \infty$	Write down the limiting value of $\frac{2n}{n+4}$ as $n \to \infty$
2.21	nth terms of linear sequences	A linear sequence starts 180 176 172 … By using the nth term, work out which term has value −1000 Work out the nth term of the linear sequence $r+s$ $r+3s$ $r+5s$ …
2.22	nth terms of quadratic sequences	Work out the nth term of the quadratic sequence 10 16 18 16 … Which term has the value 0?

Questions matter

127208 Further Coordinate Geometry (Unit 1) Straight Lines

3. Coordinate Geometry (2 dimensions only)

Ref	Content	Notes
The straight line		
3.1	Know and use the definition of a gradient	
3.2	Know the relationship between the gradients of parallel and perpendicular lines	Show that *A* (0, 2), *B* (4, 6) and *C* (10, 0) form a right-angled triangle
3.3	Use Pythagoras' theorem to calculate the distance between two points	
3.4	Use ratio to find the coordinates of a point on a line given the coordinates of two other points.	Including midpoint
3.5	The equation of a straight line $y = mx + c$ and $y - y_1 = m(x - x_1)$ and other forms	Including interpretation of the gradient and y-intercept from the equation
3.6	Draw a straight line from given information	

Questions matter

127209 Further Coordinate Geometry (Unit 2) – Circles

The coordinate geometry of circles		
3.7	Understand that $x^2 + y^2 = r^2$ is the equation of a circle with centre (0, 0) and radius r	Including writing down the equation of a circle given centre (0, 0) and radius The application of circle geometry facts where appropriate: the angle in a semi-circle is 90°; the perpendicular from the centre to a chord bisects the chord; the angle between tangent and radius is 90°; tangents from an external point are equal in length.
3.8	Understand that $(x-a)^2 + (y-b)^2 = r^2$ is the equation of a circle with centre (a, b) and radius r	Including writing down the equation of any circle given centre and radius
3.9	The equation of a tangent at a point on a circle	

Questions matter

127210 Calculus (Unit 1)

4. Calculus

Ref	Content	Notes
Differentiation		
4.1	Know that the gradient function $\frac{dy}{dx}$ gives the gradient of the curve and measures the rate of change of y with respect to x	
4.2	Know that the gradient of a function is the gradient of the tangent at that point.	
4.3	Differentiation of kx^n where n is an integer, and the sum of such functions	Including expressions which need to be simplified first Given $y = (3x + 2)(x - 3)$ work out $\frac{dy}{dx}$ Given $y = \frac{5}{x^3}$ work out $\frac{dy}{dx}$
4.4	The equation of a tangent and normal at any point on a curve	
4.5	Increasing and decreasing functions	When the gradient is positive/negative a function is described as an increasing/decreasing function

Questions matter

127211 Calculus (Unit 2)

4.6	Understand and use the notation $\frac{d^2y}{dx^2}$	Know that $\frac{d^2y}{dx^2}$ measures the rate of change of the gradient function
4.7	Use of differentiation to find maxima and minima points on a curve	Determine the nature either by using increasing and decreasing functions or $\frac{d^2y}{dx^2}$
4.8	Using calculus to find maxima and minima in simple problems	$V = 49x + \frac{81}{x} \qquad x > 0$ Use calculus to show that V has a minimum value and work out the minimum value of V
4.9	Sketch/ interpret a curve with known maximum and minimum points	

Questions matter

127212 Matrices

5. Matrix transformations

Ref	Content	Notes
		All calculations will be restricted to 2 × 2 or 2 × 1 matrices
5.1	Multiplication of matrices	Multiplying a 2 × 2 matrix by a 2 × 2 matrix or by a 2 × 1 matrix Multiplication by a scalar
5.2	The identity matrix **I**	2 × 2 only
5.3	Transformations of the unit square in the x – y plane	Representation by a 2 × 2 matrix Transformations restricted to rotations of 90°, 180° or 270° about the origin, reflections in the lines $x = 0$, $y = 0$, $y = x$, $y = -x$ and enlargements centred on the origin
5.4	Combination of transformations	Using matrix multiplications Use of **i** and **j** notation is not required

Questions matter

127213 Further Geometry (Unit 1)

6. Geometry

Ref	Content	Notes
6.1		Knowledge of perimeter and area of rectangles and circles; and of the area of triangles, parallelograms and trapezia; and of the surface area and volume of prisms, cylinders, spheres, cones and pyramids Knowledge of angle properties of parallel and intersecting lines, triangles, all special types of quadrilaterals and polygons Understand and use circle theorems: Angle at the centre is twice the angle at the circumference; angles in the same segment are equal; opposite angles in cyclic quadrilateral add up to 180°; alternate segment theorem; the theorems listed in the notes of section 3.7
Geometric proof		
6.2	Understand and construct geometrical proofs using formal arguments	The use of theorems listed in the notes of 3.7 and 6.1

127213 Further Geometry (Unit 1) continued

Trigonometry in triangles		
6.3	Sine and cosine rules in scalene triangles; area of a triangle $=\frac{1}{2}ab\sin C$	Knowledge and use of trigonometry to solve right-angled triangles is expected
Pythagoras' theorem		
6.4	Use of Pythagoras' theorem in 2D and 3D	Recognise Pythagorean triples; 3, 4, 5; 5,12,13; 8,15,17; 7, 24, 25 and simple multiples of these
6.5	Be able to apply trigonometry and Pythagoras' theorem to 2 and 3 dimensional problems	Including the angle between a line and a plane and the angle between two planes; including triangles that do not have right angles

Questions matter

127214 Further Geometry (Unit 2)

Ratios of angles and their graphs

6.6	Sketch and use graphs of $y = \sin x$, $y = \cos x$ and $y = \tan x$ for angles of any size	
6.7	Be able to use the definitions $\sin\theta$, $\cos\theta$ and $\tan\theta$, for any positive angle up to 360°(measured in degrees only)	Angles measured anticlockwise will be taken as positive
6.8	Knowledge and use of 30°, 60°, 90° triangles and 45°, 45°, 90° triangles	The use of the ratios $1 : \sqrt{3} : 2$ and $1 : 1 : \sqrt{2}$
6.9	Know and use $\tan\theta = \frac{\sin\theta}{\cos\theta}$ and $\sin^2\theta + \cos^2\theta = 1$	Including expressions to be simplified, proofs of identities and equations solved
6.10	Solution of simple trigonometric equations in given intervals	Equations will be restricted to single angles: $\sin x = 0.5$; $\sqrt{2}\sin x = \cos x$ for $0^\circ \leqslant x \leqslant 360^\circ$;