# **GCE** in Mathematics CONTRACT CONTRACTOR CO Summer 2022 only

AS (2 Units)

AS Unit 1: Pure Mathematics A Written Examination: 2 hours 30 minutes 62.5% of qualification	120 marks, 150 UMS	
Some subject content from this unit will not be assessed in Summer 2022.		
AS Unit 2: Applied Mathematics A Written Examination: 1 hour 45 minutes 37.5% of qualification	75 marks, 90UMS	
Some subject content from this unit will not be assessed in Summer 2022.		
A Level (based on A2 units only in 2022)		
A2 Unit 3: Pure Mathematics B Written Examination: 2 hours 30 minutes		

58.33% of qualification

120 marks, 210 UMS

Some subject content from this unit will not be assessed in Summer 2022.

A2 Unit 4: Applied Mathematics B Written Examination: 1 hour 45 minutes 41.67% of qualification

80 marks, 150 UMS

Some subject content from this unit will not be assessed in Summer 2022.

The content detailed below will not be subject to assessment in the GCE Mathematics examinations in Summer 2022.

#### **AS MATHEMATICS**

Content that will <b>NOT</b> be assessed in the Summer 2022 examinations.	Additional Comments
AS Unit 1 – Pure Mathematics A	
2.1.2 Algebra and Functions	
Understand the effect of simple transformations on the graph of y = f(x) including sketching associated graphs: y = af(x), y = f(x) + a, y = f(x+a), y = f(ax).	None
2.1.6 Exponentials and logarithms	
Use logarithmic graphs to estimate parameters in relationships of the form $y = ax^n$ and $y = kb^x$ , given data for $x$ and $y$ .	None
Understand and use exponential growth and decay; use in modelling (examples may include the use of e in continuous compound interest, radioactive decay,	None

Content that will <b>NOT</b> be assessed in the Summer 2022 examinations.	Additional Comments
drug concentration decay, exponential growth as model for population growth.)	
Consideration of limitations and refinements of exponential models.	
AS Unit 2 – Applied Mathematics A	
2.2.4 Statistical distributions	
Understand and use the <b>discrete uniform</b> distribution as a model.	The following, from section 2.2.4 <b>could be assessed</b> : Understand and use the <b>binomial</b> distribution, as a model, and the <b>Poisson</b> distribution, as a model.
Calculate probabilities using the <b>discrete uniform</b> distribution.	Calculate probabilities using the <b>binomial</b> and <b>Poisson</b> distributions.
Recognising when the <b>discrete uniform</b> model may not be appropriate	Recognising when the <b>binomial</b> or <b>Poisson</b> models may not be appropriate
2.2.5 Statistical hypothesis testing	
Interpret and calculate Type I and Type II errors, and know their practical meaning.	None
2.2.7 Kinematics	
Derive the formulae for constant acceleration for motion in a straight line.	The following, from section 2.2.7, <b>could be assessed</b> : <b>Understand</b> and <b>use</b> the formulae for constant acceleration for motion in a straight line.

## **A LEVEL MATHEMATICS**

Content that will <b>NOT</b> be assessed in the Summer 2022 examinations.		
A2 Unit 3 – Pure Mathematics B		
2.3.1 Proof		
Proof by contradiction (including proof of the irrationality of $\sqrt{2}$ and the infinity of primes, and application to unfamiliar proofs).		
2.3.2 Algebra and functions Additional Comments		
Sketch curves defined by the modulus of a linear function, including solving equations and inequalities involving the modulus function.	None	
Understand the effect of combinations of transformations on the graph of $y = f(x)$ , as represented by $y = af(x)$ , $y = f(x) + a$ , $y = f(x + a)$ and $y = f(ax)$ .	None	

Use of functions in modelling, including consideration of limitations and refinements of the models.	None
2.3.3 Coordinate geometry in the $(x, y)$ plane	
Use parametric equations in modelling in a variety of contexts.	The following, from section 2.3.3, <b>could be assessed</b> : <b>Understand</b> and <b>use</b> the parametric equations of curves and conversion between Cartesian and parametric forms.
2.3.5 Trigonometry	
Understand and use the standard small angle approximations of sine, cosine and tangent. $\sin \theta \approx \theta$ , $\cos \theta \approx 1 - \frac{\theta^2}{2}$ and $\tan \theta \approx \theta$ , where $\theta$ is in radians.	None
2.3.6 Differentiation	
Differentiation from first principles for $\sin x$ and $\cos x$ .	None
Construct simple differential equations in pure mathematics.	None

#### 2.3.8 Numerical Methods

Locate roots of f(x) = 0 by considering changes in sign of f(x) in an interval of x in which f(x) is sufficiently well-behaved.

Understand how change of sign methods can fail.

Solve equations approximately using simple iterative methods; be able to draw associated cobweb and staircase diagrams.

Solve equations using the Newton-Raphson method and other recurrence relations of the form  $x_{n+1} = g(x_n)$ .

Understand how such methods can fail.

Understand and use numerical integration of functions, including the use of the trapezium rule and estimating the approximate area under a curve and limits that it must lie between.

Use numerical methods to solve problems in context.

A2 Unit 4 – Applied Mathematics B	Additional Comments
2.4.1 Probability	
Use of Venn diagrams and two-way tables in the understanding and use of conditional probability.	The following, from section 2.4.1, <b>could be assessed</b> : Use of <b>tree diagrams</b> in the understanding and use of conditional probability.
2.4.2 Statistical distributions	
Link to points of inflection and the binomial distribution, in relation to the normal distribution.	The following, from section 2.4.2, <b>could be assessed</b> : Link to <b>histograms</b> , <b>mean</b> and <b>standard deviation</b> , in relation to the normal distribution.
2.4.8 Kinematics	

Derive the formulae for constant acceleration for motion in a straight line to 2 dimensions using	The following, from section 2.4.8, <b>could be assessed</b> :
vectors.	<b>Extend</b> and <b>use</b> the formulae for constant acceleration for motion in a straight line to 2 dimensions using vectors.

# GCE in Further Mathematics SUMMARY OF ASSESSMENT Summer 2022 only

AS (3 Units)

AS Unit 1: Further Pure Mathematics A Written Examination: 1 hours 30 minutes 331/ <sub>3</sub> % of qualification	70 marks, 80 UMS
Some subject content from this unit will not be asse	ssed in Summer 2022.
AS Unit 2: Further Statistics A Written Examination: 1 hour 30 minutes 331/3% of qualification	70 marks, 80 UMS
Some subject content from this unit will not be assessed in Summer 2022.	
AS Unit 3: Further Mechanics A Written Examination: 1 hour 30 minutes 331⁄₃% of qualification	70 marks, 80 UMS
Some subject content from this unit will not be assessed in Summer 2022.	
A Level (based on A2 units only in 2022)	
A2 Unit 4: Further Pure Mathematics B Written Examination: 2 hours 30 minutes 58.33% of qualification	120 marks, 210 UMS

Some subject content from this unit will not be assessed in Summer 2022.

A2 Unit 5: Further Statistics B **OR** A2 Unit 6: Further Mechanics B Written Examination: 1 hour 45 minutes 41.67% of qualification 80 marks, 150 UMS

Some subject content from these units will not be assessed in Summer 2022.

The content detailed below will **not** be subject to assessment in the **GCE Further Mathematics** examinations in Summer 2022. In Further Mathematics, learners study Unit 4 and either Unit 5 or Unit 6.

### **AS FURTHER MATHEMATICS**

Content that will <b>NOT</b> be assessed in the Summer 2022 examinations.	Additional Comments
AS Unit 1 – Further Pure Mathematics A	
2.1.2 Complex Numbers	
Simple cases of transformations of lines and curves defined by $w = f(z)$ .	None
2.1.5 Further Vectors	
Calculate the perpendicular distance between two lines, from a point to a line and a point to a plane.	None
AS Unit 2 – Further Statistics A	
2.2.1 Random Variables and the Poisson Process	
Understand and use Poisson as an approximation to the binomial distribution.	None
2.2.2 Exploring relationships between variables and goodness of fit of a model	
Calculate and interpret <b>Spearman's rank</b> correlation coefficient.	The following, from section 2.2.2, could be assessed: Calculate and interpret Pearson's product-moment correlation coefficient.
AS Unit 3 – Further Mechanics A	
2.3.3 Circular Motion	
Understand and use the motion in a <b>vertical</b> circle.	None

### **A LEVEL FURTHER MATHEMATICS**

Content that will <b>NOT</b> be assessed in the Summer 2022 examinations.	Additional Comments
A2 Unit 4 – Further Pure Mathematics B	
2.4.1 Complex Numbers	
Use de Moivre's theorem to find sums of series.	The following, from section 2.4.1, could be assessed:
Proof by induction of de Moivre's Theorem for positive	Understand de Moivre's theorem
integer values of <i>n</i> .	and use it to find <b>multiple angle</b> formulae.
Use complex roots of unity to solve geometric problems.	None
2.4.4 Further Algebra and Functions	
Find the Maclaurin series of a function (including the general term).	The following, from section 2.4.4, <b>could be assessed</b> : Understand and use partial fractions with denominators of the form $(ax + b)(cx^2 + d)$ .

Content that will <b>NOT</b> be assessed in the Summer 2022 examinations.	Additional Comments
Recognise and use the Maclaurin series for $e^x$ ,	
$\ln(1+x)$ , sin x, cos x and $(1+x)^{n}$ ,	
and be aware of the range of values of $x$ for which they are valid.	
2.4.5 Further Calculus	
Evaluate improper integrals, where either the integrand is undefined at a value in the range of integration or the range of integration extends to infinity.	None
Understand and evaluate the mean value of a function.	None
2.4.6 Polar Coordinates	
Find the area enclosed by a polar curve.	None
2.4.8 Differential equations	
Find and use an integrating factor to solve differential equations of the form $\frac{dy}{dx} + P(x)y = Q(x)$ and recognise when it is appropriate to do so.	None
Analyse and interpret models of situations with one independent variable and two dependent variables as a pair of coupled 1 <sup>st</sup> order simultaneous equations and be able to solve them.	None
A2 Unit 5 – Further Statistics B	
2.5.3 Hypothesis Testing	
Understand and use tests for (b) difference of two means for two independent normal distributions with known variances.	None
2.5.4 Estimation	
Understand and use confidence limits for (a) the mean of a normal distribution with (ii) <b>unknown</b> variance.	None
A2 Unit 6 – Further Mechanics B	
2.6.3 Moments and Centre of Mass	
Understand and use the centre of mass of <b>uniform rigid bodies</b> and <b>composite bodies</b> .	None