Comparison guide for Cambridge Pre-U Mathematics 9794

Cambridge Pre-U Mathematics 9794
Cambridge International AS & A Level Mathematics 9709
OCR AS/A Level GCE Mathematics A H240 and Mathematics B (MEI) H640

Introduction

Cambridge International has mapped the assessment objectives, methodology of assessment and topics of Cambridge Pre-U Mathematics 9794 to Cambridge International AS & A Level Mathematics 9709 and OCR AS/A Level GCE Mathematics A H240 and Mathematics B (MEI) H640 for examination in 2022. When comparing the topics, the expressions below have been used to give an indication of overlap between the syllabuses:

- Topic coverage is **identical** to the Cambridge Pre-U syllabus.
- Topic coverage is **almost identical**. Slight differences are stated.
- Topic coverage is **similar**. Differences are stated.
- This topic is **not covered** in this syllabus.

Brief summary

All four syllabuses:
- develop transferable higher order skills including reasoning, understanding, analysis, mathematical modelling, interpretation and evaluation
- have similar course aims and assessment objectives
- Cambridge Pre-U Mathematics and OCR Mathematics A and B are all linear whereas Cambridge International AS & A Level Mathematics are staged
- For OCR AS/A Level GCE graphical calculators with statistical functions are a course requirement. Cambridge Pre-U Mathematics and Cambridge International AS & A Level Mathematics stipulate that graphical calculators are not permitted within the assessment, although can be used as a learning aid.

Assessment objectives

Cambridge Pre-U	Cambridge International AS & A Level	OCR AS/A Level GCE
Assessment objectives (AOs)		
AO1 Manipulate mathematical expressions accurately, round answers to an appropriate degree of accuracy, and understand the limitations of solutions obtained using calculators.	**AO1 Knowledge and understanding** • Show understanding of relevant mathematical concepts, terminology and notation	• Select and correctly carry out routine procedures • Accurately recall facts, terminology and definitions
AO2 Construct rigorous mathematical arguments and proofs through the use of precise statements and logical deduction, including extended arguments for problems presented in unstructured form.	**AO2 Application and communication** • Present relevant mathematical work, and communicate corresponding conclusions, in a clear and logical way	• Construct rigorous mathematical arguments (including proofs) • Make deductions and inferences • Assess the validity of mathematical arguments • Explain their reasoning • Use mathematical language and notation correctly
AO3 Recall, select and apply knowledge of mathematical facts, concepts and techniques in a variety of contexts.	**AO1 Knowledge and understanding** • Recall accurately and use the appropriate mathematical manipulative techniques **AO2 Application and communication** • Recognise the appropriate mathematical procedure for a given situation	• Select and correctly carry out routine procedures • Accurately recall facts, terminology and definitions
AO4 Understand how mathematics can be used to model situations in the real world and solve problems in relation to both standard models and less familiar contexts, interpreting the results.	**AO2 Application and communication** • Apply appropriate combinations of mathematical skills and techniques in solving problems	• Translate problems in mathematical and non-mathematical contexts into mathematical processes • Interpret solutions to problems in their original context, and, where appropriate, evaluate their accuracy and limitations • Translate situations in context into mathematical models • Use mathematical models • Evaluate the outcomes of modelling in context, recognise the limitations of models and, where appropriate, explain how to refine them

Methodology of assessment

Cambridge Pre-U	Cambridge International AS & A Level	OCR AS/A Level GCE
Assessment		
• Paper 1 – 2 hours • Paper 2 – 2 hours • Paper 3 – 2 hours All components are externally assessed	**AS Level** • Paper 1 – 1 hour 50 minutes • Plus either Paper 2, 4 or 5 – 1 hour 15 minutes **A Level - Staged over 2 years** <u>Year 1</u> • Paper 1 – 1 hour 50 minutes plus either Paper 4 or 5 – 1 hour 15 minutes each <u>Year 2</u> • Paper 3 – (A Level) – 1 hour 50 minutes plus either Paper 4, 5 or 6 – 1 hour 15 minutes each (routes are 1,3,4,5 or 1,3,5,6) **A Level** • Paper 1 – 1 hour 50 minutes • Paper 3 – 1 hour 50 minutes • Plus two other papers of choice – 1 hour 15 minutes each All components are externally assessed	**AS Level** • Component 1 – 1 hour 30 minutes • Component 2 – 1 hour 30 minutes **A Level** • Component 1 – 2 hours • Component 2 – 2 hours • Component 3 – 2 hours All other components externally assessed

Topics

Cambridge Pre-U	Cambridge International AS & A Level	OCR AS/A Level GCE
Topics		
Quadratics	Topic coverage is almost identical.\n\nSolving linear inequalities is assumed prior knowledge.\n\nNo specific mention of manipulation of surds but identified as required prior knowledge.	H240/640: Topic coverage is almost identical.\n\nNo requirement to recognise and solve equations that are quadratic in some function.\n\nGraphical representation of inequalities and the use of graphical methods to solve equations expected.
Algebra	Topic coverage is identical to the Cambridge Pre-U syllabus.	H240/640: Topic coverage is almost identical. The use of the remainder theorem and partial fractions with a denominator of the form $(ax + b)(c^2x^2 + d^2)$ are not required.
Functions	Topic coverage is identical to the Cambridge Pre-U syllabus.	H240/640: Topic coverage is identical to the Cambridge Pre-U syllabus.
Coordinate geometry	Topic coverage is almost identical.\nThere is no specific reference to asymptotes, although use of the properties appears to be anticipated.	H240/640: Topic coverage is identical to the Cambridge Pre-U syllabus.
Circular measure	Topic coverage is identical to the Cambridge Pre-U syllabus.	H240/640: Topic coverage is identical to the Cambridge Pre-U syllabus.
Trigonometry	Topic coverage is almost identical.\nThe use of sine and cosine rules and the formula $\frac{1}{2}ab\sin C$ for the area of a triangle are assumed prior knowledge.	H240/640: Topic coverage is almost identical.\nThe use of small angle approximations is included.
Sequences and series	Topic coverage is almost identical.\nThere is no expectation to recognise alternating, periodic, convergent and divergent sequences.	H240/640: Topic coverage is identical to the Cambridge Pre-U syllabus.
Logarithms and exponentials	Topic coverage is identical to the Cambridge Pre-U syllabus.	H240/640: Topic coverage is identical to the Cambridge Pre-U syllabus.
Differentiation	Topic coverage is similar. Differences are:\nAlthough understanding the idea of differentiation from first principles is required, there is no requirement to be able to carry it out for x^n.	H240: Topic coverage is similar. Differences are:\nDetermining the second derivative of functions defined parametrically or implicitly is not required.

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Topics		
	Determining the second derivative of functions defined parametrically or implicated is not required. No explicit requirement to sketch the graphs of functions defined parametrically or implicitly in simple cases, and find the cartesian equation of a function defined parametrically.	Differentiation of simple trigonometric functions from first principles and the finding and determining the nature of points of inflection are included. H640: Topic coverage is similar. Differences are: Determining the first and second derivative of functions defined parametrically or the second derivative of functions implicitly is not required. Differentiation of simple trigonometric functions from first principles and the finding and determining the nature of points of inflection are included.
Integration	Topic coverage is identical to the Cambridge Pre-U syllabus.	H240/640: Topic coverage is similar. Differences are: Calculating a volume of revolution about the *x*- or *y*-axis, to include the volume of a solid generated by rotating a region between two curves is not required. Integration as the limit of a sum and the trapezium rule is included. H640 does not identify the use of trigonometric relationships to integrate functions.
Vector geometry	Topic coverage is identical to the Cambridge Pre-U syllabus.	H240/640: Topic coverage is similar. Differences are: There is no requirement to calculate the scalar product of two vectors, and use the scalar product to determine the angle between two vectors. Alternative non-vector approaches to determine whether two lines are parallel, intersect or are skew and finding the angle between two lines, and the point of intersection of two lines when it exists are used within the syllabus.
Differential equations	Topic coverage is identical to the Cambridge Pre-U syllabus.	H240/640: Topic coverage is identical to the Cambridge Pre-U syllabus.

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Topics		
Complex numbers	Topic coverage is almost identical. Illustrating inequalities involving complex numbers and the use of complex numbers expressed in polar form is expected.	H240/640: This topic is not covered in this syllabus.
Numerical methods	Topic coverage is similar. Differences are: The implement the Newton-Raphson iteration method for the numerical evaluation of an approximation to a root of $f(x) = 0$, and understand the geometric derivation of this method is not required.	H240: Topic coverage is almost identical. There is no explicit requirement to understand the concept of rate of convergence of an iterative scheme. H640: Topic coverage is identical to the Cambridge Pre-U syllabus.
Analysis of Data	Topic coverage is similar. There is no requirement to identify outliers. Construction of scatter graphs is identified as IGCSE prior knowledge and there is no requirement to use the product-moment correlation coefficient as a measure of correlation, and use covariance and variance in the construction of regression lines. Drawing and interpreting stem-and-leaf diagrams, box-and-whisker plots, histograms and cumulative frequency graphs is included within the syllabus.	H240/640: Topic coverage is similar. Differences are: There is no requirement to understand and use the term residual. The use of the product-moment correlation coefficient as a measure of correlation, and the use of covariance and variance in the construction of regression lines is omitted. Statistical sampling is included.
Probability laws	Topic coverage is almost identical. The use of the result $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ is not required.	H240/640: Topic coverage is almost identical. The evaluation of probabilities in simple cases by calculation using permutations and combinations is omitted.
Permutations and combinations	Topic coverage is identical to the Cambridge Pre-U syllabus.	H240/640: This topic is not covered in this syllabus.
Discrete random variables	Topic coverage is almost identical. The use of tables of cumulative binomial probabilities is not required.	H240/640: Topic coverage is similar. Differences are: The use of tables of cumulative binomial probabilities is not required. The knowledge of geometric distributions and their use in modelling is not required. Hypothesis testing is undertaken for the proportion in a binomial distribution.

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Topics		
The normal distribution	Topic coverage is almost identical. Recall of the conditions under which the normal distribution can be used as an approximation to the binomial approximation is required.	H240/640: Topic coverage is similar. Differences are: The use of normal tables is not required as this is a requirement for the electronic calculator. The relationship between histograms, mean and standard deviation is required. Hypothesis testing is undertaken for the mean of a normal distribution, including the use of the Pearson's correlation coefficient.
Kinematics of motion in a straight line	Topic coverage is identical to the Cambridge Pre-U syllabus.	H240/640: Topic coverage is almost identical. There is no requirement for motion in three dimensions.
Force and equilibrium	Topic coverage is identical to the Cambridge Pre-U syllabus.	H240/640: Topic coverage is identical to the Cambridge Pre-U syllabus.
Friction	Topic coverage is identical to the Cambridge Pre-U syllabus.	H240/640: Topic coverage is identical to the Cambridge Pre-U syllabus.
Newton's laws of motion	Topic coverage is identical to the Cambridge Pre-U syllabus.	H240/640: Topic coverage is identical to the Cambridge Pre-U syllabus.
Linear momentum and impulse	Topic coverage is identical to the Cambridge Pre-U syllabus	H240/640: This topic is not covered in this syllabus.
Motion of a projectile	This topic is not covered in this syllabus. A topic on energy, work and power is included in this syllabus.	H240/640: Topic coverage is identical to the Cambridge Pre-U syllabus.