Guidance on the use of past paper questions for Advanced Higher Mathematics

The Curriculum for Excellence Advanced Higher Courses draw on the strengths of popular areas of study from existing Advanced Higher with the introduction of some new content. The purpose of this support document is to help centres and departments to identify suitable past paper questions/items that could be used, or possibly amended, to support learners in their preparation for sitting question papers (exams) as part of the Advanced Higher Course assessment. The advice in this document reflects questions selected from 2010 to 2014 past papers.

When utilising any past paper questions, you need to take into account the following:

- You must select questions that provide the learners with the same level of challenge as those in the Advanced Higher Specimen Question Paper.
- You may be able to use questions as published or with amendments as suggested in the columns below.
- You must use questions that adhere to the Advanced Higher General Marking Principles and reflect the form of Detailed Marking Instructions as published in the Advanced Higher Specimen Question Paper.

If any change to a question/items is necessary, you must ensure that:

- The style and structure matches the Specimen Question Paper for Advanced Higher.
- Marking of the learner's response to the question adheres to the General Marking Principles in the Advanced Higher Specimen Question Paper.
- Marking Instructions are amended to reflect the style of the Advanced Higher Detailed Marking Instructions.

The details below should be read in conjunction with the relevant: Mandatory documentation: ♦ Course Specification ♦ Unit Specifications ♦ Course Assessment Specification Advice and guidance: ♦ Course and Unit Support Notes Assessment: ♦ Question Paper Component: — general assessment information — general marking principles and detailed marking instructions Related Information as provided in the relevant N5-Advanced Higher Course Comparison Document.	**Key for the section below:** C — amend context as required S — amend source as required St — amend question style Str — amend structure of the question Not all topic/areas of study will appear every year due to the sampling techniques used in producing question papers.

Information from the Course Assessment Specification The purpose of the question paper is to assess mathematical skills. A calculator may be used. The question paper will sample the skills, knowledge and understanding that are contained in the 'Further mandatory information on Course coverage' section of the Course Assessment Specification.	**The column below identifies additional support questions from Advanced Higher Past Papers 2010 to 2014** **Advanced Higher** Use question as published
Methods in Algebra and Calculus	
1.1 Applying algebraic skills to partial fractions	
Expressing rational functions as a sum of partial fractions (denominator of degree at most 3 and easily factorised)	2010 Q7 first part 2011 Q1 first part 2012 Q15a), Q16b) first part
1.2 Applying calculus skills through techniques of differentiation	
Differentiating exponential and logarithmic functions	2010 Q1a) 2011 Q7 2012 Q1b) 2013 Q2
Differentiating functions using the chain rule	2010 Q1a) 2011 Q3b), Q7 2012 Q1b) 2013 Q2
Differentiating functions given in the form of a product and in the form of a quotient	2010 Q1a)&b) 2011 Q3b), Q7 2012 Q1a)&b) 2013 Q2 2014 Q1a)
Differentiating inverse trigonometric functions Finding the derivative of functions defined implicitly	2011 Q3a) 2012 Q11a) 2013 Q11 2014 Q1b), Q6
Finding the derivative of functions defined parametrically	2010 Q13 2012 Q13 2014 Q4

1.3 Applying calculus skills through techniques of integration	
Integrating expressions using standard results	2010 Q7 2011 Q1, Q11a) 2013 Q6
Integrating by substitution	2010 3a) 2011 Q11b) 2012 Q8 2013 Q6 2014 Q12
Integrating by parts	2010 3b) 2011 Q16 2012 Q11b) 2013 Q8 2014 Q15
1.4 Applying calculus skills to solving differential equations	
Solving first order differential equations with variables separable	2011 Q9
Solving first order linear differential equations using an integrating factor	2012 Q15b)
Solving second order differential equations	2010 Q11 2011 Q14 2013 Q14 2014 Q8
Applications in Algebra and Calculus	
1.1 Applying algebraic skills to the binomial theorem and to complex numbers	
Expand expressions using the binomial theorem	2010 Q5 2011 Q2 2012 Q4 2013 Q1 2014 Q2
Performing algebraic operations on complex numbers	2010 Q16 2012 Q3, Q16b)
1.2 Applying algebraic skills to sequences and series	
Finding the general term and summing arithmetic and geometric sequences.	2010 Q2 2011 Q13 2012 Q2 2013 Q17 first part

	2014 Q14
Using the Maclaurin series expansion to find a stated number of terms of the power series for a simple function.	2010 Q9 2011 Q5 2012 Q6 2013 Q17 (could be done using Maclaurin series) 2014 Q9
1.3 Applying algebraic skills to summation and mathematical proof	
Applying summation formulae	2011 Q8
Using proof by induction	2010 Q8b) 2011 Q12 2012 Q16a) 2013 Q9 2014 Q7
1.4 Applying algebraic and calculus skills to properties of functions	
Find the asymptotes of rational functions.	2014 Q11a)&b)
Investigating features of graphs and sketching graphs of functions	2010 Q10 2011 Q6 2012 Q7a)&b) 2013 Q13a)-c) 2014 Q11
1.5 Applying algebraic and calculus skills to problems	
Applying differentiation to problems in context where appropriate	2012 Q12 2013 Q4a) 2013 Q13
Applying integration to problems, in context where appropriate	2010 Q15 2013 Q4b) 2013 Q16 2013 Q17 2014 Q10
Geometry, Proof and Systems of Equations	
1.1 Applying algebraic skills to matrices and systems of equations	
Using Gaussian elimination to solve a 3x3 system of linear equations	2010 Q14 2012 Q14 2014 Q3

Performing matrix operations of addition, subtraction and multiplication	2010 Q14 part 4 and 5 2011 Q4b) 2012 Q9 2013 Q3a)&c)
Calculating the determinant of a matrix	2011 Q4a) 2013 Q3b)
Finding the inverse of a matrix	2010 Q4
1.2 Applying algebraic and geometric skills to vectors	
Calculating a vector product	2010 Q6 2014 Q5
Finding the equation of a line in 3 dimensions	2011 Q15
Finding the equation of a plane	2012 Q5 2013 Q15
1.3 Applying geometric skills to complex numbers	
Performing geometric operations on complex numbers	2010 Q10 2012 Q2 part 2 2013 Q7, Q10 2014 Q16
1.4 Applying algebraic skills to number theory	
Using Euclid's algorithm to find the greatest common divisor of two positive integers	2012 Q10 2013 Q5
1.5 Applying algebraic and geometric skills to methods of proof	
Disproving a conjecture by providing a counter-example	2013 Q12
Using indirect or direct proof in straightforward examples	2010 Q8a), Q12 2013 Q12

Resources	
SQA past papers www.sqa.org.uk/pastpapers/findpastpaper.htm	Additional assessment support material is available here: Education Scotland www.educationscotland.gov.uk/ Glow www.educationscotland.gov.uk/usingglowandict/ Glow Log-in https://secure.glowscotland.org.uk/login/login.htm