Course report 2024

Advanced Higher Mathematics

This report provides information on candidates' performance. Teachers, lecturers and assessors may find it useful when preparing candidates for future assessment. The report is intended to be constructive and informative, and to promote better understanding. You should read the report with the published assessment documents and marking instructions.

We compiled the statistics in this report before we completed the 2024 appeals process.

Grade boundary and statistical information

Statistical information: update on courses

Number of resulted entries in 2023: 4,124

Number of resulted entries in 2024: 4,390

Statistical information: performance of candidates

Distribution of course awards including minimum mark to achieve each grade

A	Number of candidates	1,714	Percentage	39.0	Cumulative percentage	39.0	Minimum mark required	80
B	Number of candidates	764	Percentage	17.4	Cumulative percentage	56.4	Minimum mark required	66
C	Number of candidates	604	Percentage	13.8	Cumulative percentage	70.2	Minimum mark required	53
D	Number of candidates	564	Percentage	12.8	Cumulative percentage	83.1	Minimum mark required	39
No award	Number of candidates	744	Percentage	16.9	Cumulative percentage	100	Minimum mark required	N/A

We have not applied rounding to these statistics.

You can read the general commentary on grade boundaries in the appendix.

In this report:

- ‘most’ means greater than 70%
- ‘many’ means 50% to 69%
- ‘some’ means 25% to 49%
- ‘a few’ means less than 25%

You can find statistical reports on the statistics and information page of our website.

Section 1: comments on the assessment

Question paper 1 (non-calculator)

Feedback from the marking team suggests paper 1 was more demanding than expected, particularly questions 5 and 6. This was taken into account when setting the grade boundaries.

Question paper 2

Feedback from the marking team suggests that paper 2 was more demanding than expected, particularly questions 6 and 13. This was taken into account when setting the grade boundaries.

Section 2: comments on candidate performance

Many candidates demonstrated their knowledge and understanding of established techniques and routines to answer questions 1, 2, 3, and 8 in paper 1 and questions 1, 2, 3, and 4 in paper 2.

Some candidates produced excellent and insightful answers for the more challenging questions, in particular questions 4(b) and 8 in paper 1, and questions 9(c), 13(c), and 15(b) in paper 2.

Many candidates demonstrated a lack of knowledge of trigonometric exact values in their responses to questions 7(a) and (b) in paper 1. Some candidates did not simplify final answers, particularly in question 6 in paper 2, and some candidates' responses to questions 13 and 15 in paper 2 demonstrated a lack of familiarity with the laws of indices.

Question paper 1 (non-calculator)

Question 2(b)

Some candidates did not evaluate a simple trigonometric expression.

Question 3

A few candidates attempted to process a geometric sequence as if it were arithmetic.

Question 4(b)

Some candidates managed to determine the required matrix, either by using matrix algebra or by generating simultaneous equations.

Question 5(a)

While many candidates made the appropriate substitution, only some candidates followed through to determine that the given function was odd. A few candidates communicated that, for example, a function not being even implied that it was odd, and a few candidates attempted to tackle the question using differentiation.

Question 5(b)

Many candidates found the second derivative but only some candidates equated it to zero. Few candidates attempted to consider a potential change in concavity. A few candidates expressed the misconception that a zero second derivative combined with a non-zero first derivative is a sufficient condition for a point of inflection.

Question 6

In part (a), some candidates did not give the matrix associated with a simple reflection. In part (b), many candidates did not determine the transformation associated with a given matrix. In part (c), many candidates multiplied the two matrices in the wrong order, or incorrectly.

Question 8

Some candidates managed to complete the more challenging elements of integration by substitution, including the manipulation of less familiar trigonometric expressions.

Question paper 2

Question 5(a)

Some candidates did not process the negative term correctly in the simplification of the general term.

Question 6(b)

A few candidates managed to find and simplify the second derivative. Some candidates did not correctly follow through from their answer to part (a), and many candidates did not apply the chain rule to complete the differentiation.

Question 7

Most candidates completed part (a), either from first principles or by substitution into known expansions. Few candidates tackled part (b) by composition of their answers to part (a). Many candidates multiplied the two expressions, while some did not use their earlier answers at all.

Question 8

Many candidates made good progress, despite the unusual form of a volume of revolution question.

Question 9

Most candidates found the required expression for the third term in part (a), but many candidates did not carry out the simple processing required in part (b).

Question 10

Many candidates were successful in processing the rates of change and were able to demonstrate their understanding of the relationships between them. Many candidates gave an incorrect unit or did not include a unit in their final answer. A few candidates introduced a new, non-standard variable without definition.

Question 11

Some candidates gave expressions for consecutive odd integers rather than consecutive integers, and few candidates gave a source set.

Question 15(a)

Many candidates did not correctly separate variables or integrate to give a negative logarithmic term. Few candidates correctly processed exponential terms.

Section 3: preparing candidates for future assessment

Teachers and lecturers should encourage candidates to thoroughly revise established techniques and routines to ensure their familiarity and understanding. Established routines are particularly useful when solving a differential equation using an integrating factor (paper 2, question 13(c)), and dealing with a standard integral (paper 2, question 15(a)).

Candidates should practise proof questions so that they are able to give the form of, for example, consecutive integers (paper 2, question 11). Candidates should also be able to give the correct general form of sets of integers, including consecutive, odd and even. Candidates should understand that the rigour of the proof depends on accurate definition of a source set.

Candidates should learn reliable methods of determining a matrix from a given transformation and identifying the transformation associated with a given matrix (paper 2, question 6).

Teachers and lecturers should emphasise accurate use of notation, terminology, brackets, and symbols to their candidates. In question 2 in paper 1, a few candidates who worked in degrees omitted the degree sign throughout the question. In question 5(a) in paper 2, some candidates omitted or misplaced brackets in the numerical part of the general term of the binomial expansion. The absences of brackets led some candidates to arrive at an incorrect answer in question 6(b) in paper 2. If candidates use a variable that does not appear in the question, then they must define it, unless it is a standard variable (such as t for time). See question 10 in paper 2.

Wherever possible, teachers and lecturers should challenge misconceptions when they arise. For example, incorrect material relating to points of inflection appears on the internet, namely the statement that there is a point of inflection where the second derivative is zero, but the first derivative is not. Candidates would benefit from investigating a simple counterexample that shows this statement to be false.

Teachers and lecturers should encourage candidates to write numbers, symbols, and letters clearly and unambiguously. Markers can find candidates' handwriting difficult to interpret, for example a 5 can look like a 3 or a 6 and an equals sign can look like an inequality. Candidates should not write over their original answers if they make a mistake. They should score through the original answer and write their new answer legibly on a blank space in their answer booklet. Candidates should ensure their layout leaves the marker in no doubt about what they should mark and what they can ignore.

Teachers and lecturers should remind candidates that they need to be accurate when writing integrals. This is especially important when the relevant variable is not obvious, such as integration by substitution (paper 1, question 8), volume of revolution (paper 2, question 8), and first-order differential equations involving two variables (paper 2, question15(a)). The constant of integration must be present in questions that require its evaluation or subsequent manipulation, such as questions 13(c) and 15(a) in paper 2. Teachers and lecturers should encourage candidates to develop the habit of including a constant when determining an

indefinite integral and to take care with notation if the constant is subsequently manipulated, for example when both sides of an equation are multiplied by a constant.

Teachers and lecturers should be aware of the continuing need to reinforce prior knowledge, including basic algebra, trigonometric exact values, and the laws of logarithms and indices. For example, in questions 13(c) and 15(a) in paper 2, candidates had to draw on previous knowledge of the laws of logarithms and indices to obtain the required expressions.

Teachers and lecturers should continue to encourage candidates to look for accessible marks in the parts of the assessment they find more challenging, and to persevere and work to the end of each question paper.

Teachers, lecturers and candidates should continue to make full use of published materials, including Understanding Standards material, the course specification, and marking instructions for recent past papers.

Appendix: general commentary on grade boundaries

SQA's main aim when setting grade boundaries is to be fair to candidates across all subjects and levels and maintain comparable standards across the years, even as arrangements evolve and change.

For most National Courses, SQA aims to set examinations and other external assessments and create marking instructions that allow:

- a competent candidate to score a minimum of 50% of the available marks (the notional grade C boundary)
- a well-prepared, very competent candidate to score at least 70% of the available marks (the notional grade A boundary)

It is very challenging to get the standard on target every year, in every subject, at every level. Therefore, SQA holds a grade boundary meeting for each course to bring together all the information available (statistical and qualitative) and to make final decisions on grade boundaries based on this information. Members of SQA's Executive Management Team normally chair these meetings.

Principal assessors utilise their subject expertise to evaluate the performance of the assessment and propose suitable grade boundaries based on the full range of evidence. SQA can adjust the grade boundaries as a result of the discussion at these meetings. This allows the pass rate to be unaffected in circumstances where there is evidence that the question paper or other assessment has been more, or less, difficult than usual.

- The grade boundaries can be adjusted downwards if there is evidence that the question paper or other assessment has been more difficult than usual.
- The grade boundaries can be adjusted upwards if there is evidence that the question paper or other assessment has been less difficult than usual.
- Where levels of difficulty are comparable to previous years, similar grade boundaries are maintained.

Every year, we evaluate the performance of our assessments in a fair way, while ensuring standards are maintained so that our qualifications remain credible. To do this, we measure evidence of candidates' knowledge and skills against the national standard.

During the pandemic, we modified National Qualifications course assessments, for example we removed elements of coursework. We kept these modifications in place until the 2022–23 session. The education community agreed that retaining the modifications for longer than this could have a detrimental impact on learning and progression to the next stage of education, employment or training. After discussions with candidates, teachers, lecturers, parents, carers and others, we returned to full course assessment for the 2023–24 session.

SQA's approach to awarding was announced in March 2024 and explained that any impact on candidates completing coursework for the first time, as part of their SQA assessments, would be considered in our grading decisions and incorporated into our well-established

grading processes. This provides fairness and safeguards for candidates and helps to provide assurances across the wider education community as we return to established awarding.

Our approach to awarding is broadly aligned to other nations of the UK that have returned to normal grading arrangements.

For full details of the approach, please refer to the National Qualifications 2024 Awarding — Methodology Report.