Course report 2023

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 in conjunction with the published assessment documents and marking instructions.

The statistics in the report were compiled before any appeals were completed.

Grade boundary and statistical information

Statistical information: update on courses

Number of resulted entries in 2022: 3,917

Number of resulted entries in 2023: 4,124

Statistical information: performance of candidates

Distribution of course awards including minimum mark to achieve each grade

A	Number of candidates	1,573	Percentage	38.1	Cumulative percentage	38.1	Minimum mark required	70
B	Number of candidates	926	Percentage	22.5	Cumulative percentage	60.6	Minimum mark required	56
C	Number of candidates	634	Percentage	15.4	Cumulative percentage	76	Minimum mark required	43
D	Number of candidates	514	Percentage	12.4	Cumulative percentage	88.4	Minimum mark required	29
No award	Number of candidates	477	Percentage	11.6	Cumulative percentage	100	Minimum mark required	N/A

Please note that rounding has not been applied 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 more statistical reports on the statistics and information page of SQA’s 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, 7, and 9. This was taken into account when setting the grade boundaries.

Question paper 2 (calculator)

Feedback from the marking team suggests that paper 2 was more demanding than expected, particularly questions 2, 7, and 8. 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, 4, and 5 in paper 1 and questions 1, 3, 4, 5, and 6 in paper 2.

Some candidates produced excellent and insightful answers for the more challenging questions, in particular questions 7(b), 13, and 14 in paper 2.

Many candidates made basic algebraic errors in questions 5 and 7(a) in paper 1 and question 12 in paper 2. Many candidates demonstrated a lack of knowledge of trigonometric exact values in their responses to questions 6 and 9 in paper 1. Some candidate responses to questions 10 and 13 in paper 2 demonstrated a lack of familiarity with the laws of logarithms and indices.

Question paper 1 (non-calculator)

Question 3

Many candidates carried out Gaussian elimination correctly, but some candidates interpreted the outcome incorrectly.

Question 5

Many candidates made at least one elementary error, such as omitting part of the solution or processing simultaneous equations incorrectly following substitution.

Questions 6(a) and 6(b)

Some candidates evaluated a trigonometric exact value incorrectly.

Question 7(a)

Many candidates were able to interpret given formulae but were unable to carry out the subsequent straightforward algebraic manipulation.

Question 7(b)

Most candidates made errors in stating the required subtraction. Many candidates did not manage to complete the necessary arithmetic to gain any follow-through marks.

Question 8(a)

Many candidates were able to produce a counterexample with appropriate communication.

Question 9(b)(i)

Many candidates made an error in giving a trigonometric exact value, multiplying matrices in the correct order, or in the multiplication itself.

Question 9(c)

Few candidates identified the link between this part of the question and the angle from question 9(b)(i).

Question paper 2 (calculator)

Question 2

Many candidates did not process the form of the integral correctly.

Question 6(c)

Many candidates were able to apply the result of question 6(b) in an unfamiliar situation.

Question 7(a)

Many candidates made basic errors in applying a formula approach, or in dealing with the constant of integration.

Question 8(b)

The initial part of this question involved two substitutions into a given formula. Many candidates made an error in at least one of the substitutions.

Question 10

This question was intended to be challenging because it did not direct candidates to use logarithmic differentiation. Despite this, many candidates produced a good response.

Question 11(b)

Although this question generally performed as expected, few candidates converted the units in the rate of change of volume, and some omitted (or used incorrect) units in their final answer.

Section 3: preparing candidates for future assessment

Question paper 1 (non-calculator) and question paper 2 (calculator)

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 7(a)), and dealing with a standard integral (paper 2, question 2).

Proof by induction presents difficulties for some candidates. Teachers and lecturers should ensure candidates revise this area thoroughly, particularly communication and providing algebraic justification. Candidates should understand the requirement to specify source sets when giving the form of, for example, odd integers (paper 1, question 8(b)).

Candidates benefit from thorough understanding of the link between a rotation matrix and its associated angle. This year, candidates who attempted question 9(c) in paper 1 generally repeatedly multiplied matrices and did not consider the angles involved.

Teachers and lecturers should emphasise accurate use of notation, terminology, brackets, and symbols to their candidates. Many candidates omit linking words and phrases, especially where proof or justification is required. In question 5(a) in paper 2, some candidates omitted brackets in the numerical part of the general term in a binomial expansion.

Teachers and lecturers should urge 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.

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 2, question 15(b)). The constant of integration must be present in questions, such as questions 7(a), 13, and 15(c) 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 in subsequent manipulation of the constant.

Centres should be aware of the continuing need to reinforce prior knowledge like basic algebra, trigonometric exact values, and the laws of logarithms and indices. Understanding Standards and other published material can help with this.

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

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.

Grade boundaries from question papers in the same subject at the same level tend to be marginally different year on year. This is because the specific questions, and the mix of questions, are different and this has an impact on candidate performance.

This year, a package of support measures was developed to support learners and centres. This included modifications to course assessment, retained from the 2021–22 session. This support was designed to address the ongoing disruption to learning and teaching that young people have experienced as a result of the COVID-19 pandemic while recognising a lessening of the impact of disruption to learning and teaching as a result of the pandemic. The revision support that was available for the 2021–22 session was not offered to learners in 2022–23.

In addition, SQA adopted a sensitive approach to grading for National 5, Higher and Advanced Higher courses, to help ensure fairness for candidates while maintaining standards. This is in recognition of the fact that those preparing for and sitting exams continue to do so in different circumstances from those who sat exams in 2019 and 2022.

The key difference this year is that decisions about where the grade boundaries have been set have also been influenced, where necessary and where appropriate, by the unique circumstances in 2023 and the ongoing impact the disruption from the pandemic has had on learners. On a course-by-course basis, SQA has determined grade boundaries in a way that is fair to candidates, taking into account how the assessment (exams and coursework) has functioned and the impact of assessment modifications and the removal of revision support.

The grade boundaries used in 2023 relate to the specific experience of this year's cohort and should not be used by centres if these assessments are used in the future for exam preparation.

For full details of the approach please refer to the National Qualifications 2023 Awarding — Methodology Report.