



External Assessment Report 2013

Subject(s)	Mathematics 1, 2, 3
Level(s)	Advanced Higher

The statistics used in this report are pre-appeal.

This report provides information on the performance of candidates which it is hoped will be useful to teachers/lecturers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding. It would be helpful to read this report in conjunction with the published question papers and marking instructions for the examination.

Comments on candidate performance

General comments

Most candidates were able to access all of the questions. There were many solid performances. It was pleasing to see that a number of candidates fully factorised or simplified their answers accurately.

However, careless errors were frequent, particularly with positive and negative signs. Inaccurate use of parentheses, and unnecessary, simple arithmetical errors led many candidates to lose at least one mark, but sometimes many more due to being unable to follow through with their solution. Complex numbers and graphs remain challenging topics for many candidates.

The paper consists of written response questions with a total maximum possible mark of 100.

Nearly all candidates attempted all questions.

Questions 1, 2, 3, 4, 5, 8, 11 & 15 were done well by the majority. Candidates answered less well on questions 10, 13, 14, 16 & 17, but no questions were tackled poorly by all.

Candidates' performance in proof by induction is improving, but there is room for more rigour. Candidates appear confident and well-drilled on Vector Geometry and Calculus.

The average (mean) mark for the paper was 57.3. This compares with 52.8 (2012), 51.1 (2011), 51.5 (2010).

Areas in which candidates performed well

- ◆ Question 1: Candidates started confidently with the Binomial expansion.
- ◆ Question 2: Nearly all candidates carried out the differentiation accurately.
- ◆ Question 3a) and b): Most candidates understood the processes required here and carried them out accurately.
- ◆ Question 8: Many candidates tackled Integration by parts very well, and a number obtained full marks.
- ◆ Question 11: Implicit differentiation was handled well, although some candidates struggled with the algebraic manipulation.
- ◆ Question 15: Candidates answered this question involving vectors particularly well and showed a high degree of confidence in handling vector geometry.

Areas which candidates found demanding

- ◆ Question 1: Too many candidates wrote with bad form, not using brackets before evaluating. Also, some candidates were unable to recall the correct rule for dealing with the powers of x .
- ◆ Question 3c): Several candidates used the inverse matrix instead of the transpose.

- ◆ Question 4b): $\exp(3\ln 3) = 9$ was a common error.
- ◆ Questions 6: Many candidates did not recognise the form to integrate and forgot to use modulus signs.
- ◆ Question 7: A significant number of candidates did not recognise the conjugate.
- ◆ Question 10: Many candidates struggled to describe the loci. Some candidates did not appear to have covered this part of the syllabus. It was poorly attempted and sometimes missed out.
- ◆ Question 12: A number of candidates tried to use proof by contradiction, but started from the wrong conjecture. Several candidates confused 'multiple' with 'factor'.
- ◆ Question 13: A large number of candidates knew very little about odd, even and modulus functions in relation to graphs.
- ◆ Question 14: The majority of candidates tried to use an incorrect particular integral. In addition, a number evaluated the constants of the complimentary function before attempting to obtain the particular integral.
- ◆ Question 16: The majority of candidates failed to recognise the need to use partial fractions or were let down by weak algebraic skills.
- ◆ Question 17: Only a very small handful of candidates obtained the constant of integration. Many candidates did not establish the link between the integration of the given series and the given logarithmic expressions. A very small number of candidates considered the required number of terms to evaluate $\ln 2$ correctly.

Advice to centres for preparation of future candidates

Some candidates appeared to have been disadvantaged by not having covered all areas of the syllabus (complex conjugate, transpose, loci, modulus signs, graphs, expressions for gcds, displacement, velocity and acceleration). Centres should consider how best to cover and revise all areas, possibly also providing guidance to candidates as to where further examples and practice can be found.

Teachers should encourage arithmetical accuracy and bring attention to unnecessary arithmetical errors when they occur.

A number of candidates would benefit from being given more guidance for proofs. They require more practice and advice about rigour and logical layout.

The SQA website contains the Marking Instructions for 2013 (as well as previous years). All those teaching Advanced Higher Mathematics, and candidates undertaking the course, may benefit from looking at these detailed Marking Instructions for further advice and guidance.

Statistical information: update on Courses

Advanced Higher Mathematics

Number of resulted entries in 2012	3239
------------------------------------	------

Number of resulted entries in 2013	3314
------------------------------------	------

Statistical information: Performance of candidates

Distribution of Course awards including grade boundaries

Distribution of Course awards	%	Cum. %	Number of candidates	Lowest mark
Maximum Mark 100				
A	25.7%	25.7%	853	72
B	23.2%	48.9%	769	59
C	20.5%	69.5%	681	47
D	9.6%	79.1%	319	41
No award	20.9%	100.0%	692	-

General commentary on grade boundaries

- ◆ While SQA aims to set examinations and create marking instructions which will allow a competent candidate to score a minimum of 50% of the available marks (the notional C boundary) and a well prepared, very competent candidate to score at least 70% of the available marks (the notional A boundary), it is very challenging to get the standard on target every year, in every subject at every level.
- ◆ Each year, SQA therefore holds a grade boundary meeting for each subject at each level where it brings together all the information available (statistical and judgemental). The Principal Assessor and SQA Qualifications Manager meet with the relevant SQA Business Manager and Statistician to discuss the evidence and make decisions. The meetings are chaired by members of the management team at SQA.
- ◆ The grade boundaries can be adjusted downwards if there is evidence that the exam is more challenging than usual, allowing the pass rate to be unaffected by this circumstance.
- ◆ The grade boundaries can be adjusted upwards if there is evidence that the exam is less challenging than usual, allowing the pass rate to be unaffected by this circumstance.
- ◆ Where standards are comparable to previous years, similar grade boundaries are maintained.
- ◆ An exam paper at a particular level in a subject in one year tends to have a marginally different set of grade boundaries from exam papers in that subject at that level in other years. This is because the particular questions, and the mix of questions, are different. This is also the case for exams set in centres. If SQA has already altered a boundary in a particular year in, say, Higher Chemistry, this does not mean that centres should necessarily alter boundaries in their prelim exam in Higher Chemistry. The two are not that closely related, as they do not contain identical questions.
- ◆ SQA's main aim is to be fair to candidates across all subjects and all levels and maintain comparable standards across the years, even as arrangements evolve and change.