



External Assessment Report 2013

Subject(s)	Mathematics
Level(s)	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

This year's paper produced a good spread of marks as well as candidates' responses that were very varied. Markers and centres reported that the level of demand and coverage of the course was good. A high percentage of pupils, at all levels, tackled most questions and there were few blank spaces. It was felt, however, that some responses indicated a slight dip in presentation and communication skills. Some solutions lacked rigour or contained working that was disjointed and unclear. There were a significant number of trivial arithmetical errors in some scripts. Questions requiring a little insight proved challenging for all but the most able. 'Show that' questions were poorly attempted, and some candidates seemed to lack the necessary strategies for tackling such tasks.

Paper 1 Section A: Objective Type Questions: Total mark possible 40

Candidates' performance was more in line with past examinations, after the dip last year, with an average mark of 26.4 (compared with 24.4 in 2012, 27.1 in 2011, 27.9 in 2010, and 27.2 in 2009). Around three quarters of the questions provide opportunities at C grade and are intended to test routine mathematical skills.

Paper 1 Section B: Written response questions: Total mark possible 30

Nearly all candidates attempted all questions. They found the first parts of the questions straightforward, with the following parts more demanding. The average mark was approximately 17.

Paper 2 Section A: Written response questions: Total mark possible 60

Again, most candidates attempted the whole paper. The average mark was just over 31.

The average mark for both of the written response papers was just over 48.

Areas in which candidates performed well

Objective type questions

In questions 1–3, 5–9, 11, 13, 16 and 18 more than 70% of candidates chose the correct response. Questions 4 and 10 were more demanding than intended, while Question 18 was less demanding.

Written response questions

Paper 1

Question 21: Most candidates knew how to tackle this question and both 'completing the square' and 'equating coefficients' were widely used. In the first method, some candidates failed to make the correct initial factorisation, but were able to access the remaining marks by follow-through if their arithmetic was accurate. When equating coefficients, candidates' success depended on arithmetical accuracy.

Questions 22a), b), 23a): Most candidates were well prepared for carrying out the straightforward processes required here.

Question 24a): Most candidates knew how to tackle this straightforward question, but the omission of 'parallel' or equivalent was extremely common.

Paper 2

Question 1: There were fewer instances of students equating zeros in this question and throughout the paper.

Question 4: Candidates were competent in the method for finding an area. However, many missed out showing that B was the point (-3, -3), and there were instances of poor presentation such as one or more brackets being omitted, the lack of 'dx', and writing $-\frac{27}{4} = \frac{27}{4}$.

Question 5: Some candidates handled the logarithmic equation well and knew the rules to apply, although it appeared that some candidates may have had little exposure to such equations.

Question 9a): the majority of candidates made a good attempt at 'half-life'.

Areas which candidates found demanding

Paper 1

Question 23b): The link to part a) of the question was not identified by most candidates.

Questions 22 (c), (d) and 24a): Candidates' poor communication skills meant that many did not attain all the marks available. In some cases, vectors were not clearly stated or identified.

Question 24b): Few candidates set their solution in a logical order. Very few candidates were able to express the coordinates of the point on the x-axis in the form (x, 0, 0).

Paper 2

Question 3: Some candidates incorrectly factorised the quadratic expression that they had correctly found, and then followed this with an incomplete and inaccurate nature table. However, it was gratifying to see a few elegant solutions from candidates who clearly understood the principle of algebraic division and followed this by taking the second differential to determine the nature.

Question 5: A significantly high proportion of candidates rejected solutions by erroneously thinking that they were not real numbers.

Question 7a): Despite being considered a relatively straightforward example of its type, this part was either omitted or poorly attempted by most candidates.

Question 8: Many candidates who made some progress with their trigonometric expressions were unable to fully solve their equations.

Question 9b): Some candidates failed to fully interpret the requirements of this part and lacked the necessary precision.

Advice to centres for preparation of future candidates

Paper 1 Section A: objective type questions

Use can be made of the bank of questions available on the SQA website to prepare candidates for this type of question.

There is no penalty for wrong answers to these first 20 questions, so candidates should not leave any of them blank.

Paper 1 section B and paper 2: written response questions

Candidates should be encouraged to make the connections between parts of questions, particularly where there are three or four parts. These are almost always linked and, in some instances, an earlier result in part a) or b) is needed and its use would avoid repeated work by candidates.

General

An over reliance on the completion of past papers may give some candidates a false sense of security. For this reason, learners should experience questions that are set in unfamiliar contexts. They should be given regular opportunities to interpret and solve problems. They should be exposed to proof, logical thinking strategies and rigour.

It would be advantageous if candidates were routinely reminded of the requirement for accuracy, for detail, and for illustrating their understanding in their working. They will not be reminded in every question to 'show their working': the general instructions clearly state that 'full credit will be given only when the solution contains appropriate working'.

It is evident that learners would benefit from further practice in algebraic manipulation. Few use the simplest methods for solving equations, and many end up with large numbers and complex fractions.

Centres are encouraged to ensure that candidates are aware of necessary rigour: the omission of brackets in cases where the meaning is altered should be penalised, integrals should contain 'dx', and relevant variables should be used when a context-based problem is posed. However, correct strategies and demonstration of understanding should be given credit.

Adopting a clear vector approach rather than 'stepping out' may help a lot of candidates in their communication. This technique can be applied in circle, vector and other problems involving relationships between pairs of coordinates.

Communication is particularly important in questions that contain the words 'show that'. In this type of question, candidates must get the result quoted in the question. Failure to do so will prevent them gaining the final mark, at least for that question or part of question.

Candidates need to be encouraged to appreciate the significance for setting out solutions in a logical order.

The SQA website contains the Marking Instructions for 2013 (as well as previous years). All those teaching Higher Mathematics, and candidates undertaking the course, will find further advice and guidance in these detailed Marking Instructions.

Statistical information: update on Courses

Higher Mathematics

Number of resulted entries in 2012	20,564
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Number of resulted entries in 2013	20,663
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Statistical information: Performance of candidates

Distribution of Course awards including grade boundaries

Distribution of Course awards	%	Cum. %	Number of candidates	Lowest mark
Maximum Mark 130				
A	24.8%	24.8%	5121	94
B	23.8%	48.5%	4908	76
C	24.0%	72.5%	4950	59
D	10.2%	82.7%	2104	50
No award	17.3%	100.0%	3580	-

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.