External Assessment Report 2009

Subject	Mathematics
Level	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

There has again been an increase in the number of candidates presented for AH Mathematics.
The overwhelming majority of candidates seem well prepared for the paper. Analysis of the marks shows that around 90% of candidates scored 30 or more.

Areas in which candidates performed well

The established pattern of good marks early in the paper was the norm. Routine calculus and algebraic questions were all done well. Many marks were obtained from the early parts of the long questions at the end of the paper.

Areas which candidates found demanding

Question 12 proved to be the most demanding in the paper.
Other demanding questions included: 5, 7, 9 and 11.
In some questions, it was often the last few marks which were demanding. This was a feature in the following questions: 4 (induction); 10 (Euclidean algorithm); 14 (Maclaurin expansion); 15 (area calculation); 16 (three-dimensional geometry).

Advice to centres for preparation of future candidates

Centres are to be congratulated on the level of preparation demonstrated by candidates and should keep up this good work.

To assist centres in this, a question-by-question set of comments is included below.

Comments on 2009 AH Mathematics

Q1
The first part was intended to be a question which tested routine differentiation of a product. For most candidates it was routine, but those who multiplied out and then differentiated found it much more of a challenge.
The second part provided a range of strategies which, on the whole, yielded success.
Q2
Although this topic is rarely assessed, the question was done well.
Q3
This produced variable results. Some candidates found it straightforward, but others had difficulty dealing with the powers and with $\int x^{-2}dx$.
Q4
This question should have been a routine proof by induction. Many candidates accessed the first three marks but very few progressed correctly to the end. A number of candidates who expressed the $(k + 1)$th term in partial fractions found it easier to access the marks.
Q5
Both standard methods were used in this question. Many candidates gained the first two marks but were unable to progress from there.

Q6
Many candidates failed to identify the complex conjugate correctly or to find the correct value for the argument
Q7
Many candidates found this question demanding. Many candidates failed to use the hint to good effect and tried to use it to simplify the denominator. However, a significant number persevered and gained full marks. It was disappointing to find solutions which involved degrees.
Q8
Most candidates gained the marks in part (a) to be and the majority got full marks for (b). There were however, some attempts at invalid methods in part (b).
Q9
The topic of integration by parts is routine but this application was not. There were few completely successful attempts at this question. As in question 7, degrees appeared in many solutions.
Q10
It is a while since the Euclidean algorithm made an appearance on a question paper. Nearly all candidates correctly evaluated the gcd, but few correctly completed the rest of the question.
Q11
This question attempted to test logarithmic differentiation in an unusual fashion. There were many fully correct solutions but also a number of incomplete solutions.
Q12
As intended, this question proved to be demanding. There was evidence of confusion over arithmetic sequences and geometric sequences and few candidates showed that they recognised that p^{2n} was equal to $(p^n)^2$, a property which was the key to a full solution.
Q13
This question was a relatively routine graphical question. The asymptotes were generally obtained, although there was not always a clear justification of the horizontal asymptote. There very few correct justifications that f(x) was strictly decreasing. However, the last 4 marks were readily accessible to candidates.
Q14
This was quite a demanding partial fraction question. Most solutions set things up as they should have been. It was disappointing that arithmetic errors quite often resulted in 2 correct coefficients then produced a third non-zero value. In the first part of the question, this error cost very little but it impeded progress in the second part, making it more challenging. It was pleasing that quite a significant proportion of solutions were fully correct.
Q15
The majority of candidates made a promising start on this question. However, a common error was to lose track of the signs and obtain an integrating factor of $(x + 1)^3$. Even those who arrived at a correct answer to part (a) found part (b) a real challenge and fully correct solutions were very rare.
Q16
Part (a) was routine and done well with the majority of attempts gaining all the marks for it. Few candidates completed part (b) correctly although many were able to access marks in part (c).

Statistical information: update on Courses

Number of resulted entries in 2008	2752

Number of resulted entries in 2009	3027

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	21.9%	21.9%	662	72
B	20.5%	42.4%	621	59
C	23.1%	65.4%	698	46
D	11.8%	77.2%	356	39
No award	22.8%	100.0%	690	-

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.