Principal Assessor Report 2007

Assessment Panel:	**Mathematics and statistics**

Qualification area

Subject(s) and Level(s) Included in this report	**Mathematics : Advanced Higher**

Comments on candidate performance

General comments

Overall, this paper performed as the examining team had hoped. There was sufficient variety to enable all candidates to manage much of it and it also provided a good challenge for the best.

Areas in which candidates performed well

Candidates showed a good grasp of the basic calculus topics included in the course.

Areas which candidates found demanding

The following topics proved to be demanding:
extended questions;
proof by geometry;
geometry in the complex plane;
the question on summation.

Advice to centres for preparation of future candidates

From the early stages, candidates require to be drilled in basic skills.
There is no doubt that many candidates lost marks due to:
poor algebraic skills;
poor arithmetic skills;
illegible work.

The attached set of question-by-question comments (along with the marking instructions which are available on the website) should assist centres in preparing candidates.

Comments on Advanced Higher Mathematics 2007

Overall, most candidates seemed adequately prepared and provided worthwhile evidence of mathematical knowledge. General weaknesses included:

- poor algebraic skills, for example, in question 3;
- poor arithmetic skills, for example, in question 4;
- really untidy work. **Candidates who present answers badly run a serious risk of markers being unable to read what is written and not awarding all possible marks.**

The following comments need to be read alongside the question paper.

Question 1: Binomial expansion
This was intended to be an easy start and so it proved. Very few didn't attempt it and the few who got it wrong tended to ignore the negative sign.

Question 2: Differentiation
The first part was generally done well although some treated it as a product. Part (b) proved more of a challenge and was often incomplete or incorrect. It was disappointing to see $\frac{1}{4}$ as the derivative of $\ln 4$ in some scripts.

Question 3: Complex roots
This should have been a standard question but many struggled to verify the given root, the second root was generally obtained but not the third. It was disappointing that, having got to $z + 6 = 0$, some candidates said that the third root was 6.

Question 4: Partial fractions and integration
Many candidates were entirely successful. A minority failed to factorise $x^2 - x - 6$ which made progress very difficult. Another common error was to say that $(-2)(-5)$ was -10. It was also very disappointing that a large number of solutions involved an unsimplified fraction.

Question 5: Matrices
This was generally done well with most candidates knowing what they had to do. Poor arithmetic was to blame for most failures.

Question 6: Series expansion
This caused some problems. The first part was satisfactory but very few knew how to replace x by $2x$ for the second part or how to deal with the third part. Most attempted to use differentiation and many candidates struggled with this.

Question 7: Euclidean algorithm
Many candidates managed this well although some stopped abruptly after the first stage.

Question 8: Second order differential equation
Despite it being a non-trivial question, this was generally done well. Having said that, elementary errors such that $x + 3 = 0$ means that $x = 3$ resulted in marks being lost.

Question 9: Summation
This proved to be the first major hurdle for most candidates. A small minority were successful with either of the two routine methods. Many attempted to use proof by induction. Very few got full marks.

Question 10: Integration by substitution

This was not done as well as had been expected. A significant number of candidates dealt correctly with the initial stages but were unable to complete the substitution so attempted an integration which involved both x and u.

Question 11: Complex plane
Very few candidates knew how to tackle this question, but a few did obtain full marks.

Question 12: Proof by induction
As is so often the case, this was not well done. It is a difficult topic but year after year only the best candidates are able to succeed.

Question 13: Parametric differentiation
This was very much a question of two halves with most candidates doing well in part (a) but very few having any success in (b). In (b), many simply differentiated $\frac{dy}{dx}$ with respect to t and thought that the result was $\frac{d^2y}{dx^2}$. Very few obtained the correct value for k.

Question 14: Differential equation
Few candidates did well on this. It is possible that the use of an unfamiliar symbol as a variable may have added to the difficulty. Those who managed the whole question successfully were very few in number and deserve to feel extremely satisfied.

Question 15: Three-dimensional geometry
A difficult topic and although the first two parts should have been accessible, they proved to be a challenge for most who attempted them.

Question 16: Curve sketching and integration
Few obtained correct answers to part (a) and it was fortunate that this did not prevent further progress. The integration in part (b) was a difficult one but some rose to the challenge. By comparison, part (c) was less challenging.

Statistical information: update on Courses

Number of resulted entries in 2006	2,598

Number of resulted entries in 2007	2,484

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	22.2	22.2	552	68
B	20.2	42.4	501	55
C	22.7	65.1	565	42
D	12.6	77.7	312	35
No award	22.3	100.0	554	-

General commentary on passmarks and grade boundaries

- While SQA aims to set examinations and create mark schemes which will allow a competent candidate to score a minimum 50% of the available marks (notional passmark) and a very well-prepared, very competent candidate to score at least 70%, it is almost impossible to get the standard absolutely on target every year, in every subject and level
- Each year we therefore hold a passmark meeting for each subject at each level where we bring together all the information available (statistical and judgmental). 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 senior management team at SQA
- We adjust the passmark downwards if there is evidence that we have set a slightly more demanding exam than usual, allowing the pass rate to be unaffected by this circumstance
- We adjust the passmark upwards if there is evidence that we have set a slightly less demanding exam than usual, allowing the pass rate to be unaffected by this circumstance
- Where the standard appears to be very similar to previous years, we maintain similar grade boundaries
- 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 are different. This is also the case for exams set in centres. And just because SQA has altered a boundary in a particular year in say Higher Chemistry 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
- Our main aim is to be fair to candidates across all subjects and all levels and maintain standards across the years, even as arrangements evolve and change.