



External Assessment Report 2009

Subject	Mathematics
Level	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

Paper 1A

The Objective Questions

The candidates found this section slightly harder this year, with an average of 27.27 as against 29.13 last year. There were two items in which less than 40% of those who gave an answer chose the correct option.

Paper 1B

The candidates found this section harder this year, with an average of 16.03 as against 19.50 last year.

Paper 2

The paper was constructed so that the more demanding questions would be in the latter half. The marks for the questions indicated that this was indeed the case.

The candidates had more difficulty with this paper this year than last year and some questions did not perform as expected. The grade boundaries were set to reflect this.

Areas in which candidates performed well

Paper 1A

The following topics were handled well in the objective questions:

Term of a recurrence relation, circle facts, gradient of tangent to curve, limit of a recurrence relation

Paper 1B

The equation of the altitude was well done, as was the trigonometric identity in question 24.

Paper 2

Stationary points, composite functions, roots of a cubic and interpreting a trigonometric graph were all well done.

Areas which candidates found demanding

The Objective Questions

Paper 1A

Question 11 related to a trigonometric equation and how many solutions it had in the interval $0 < x < 2\pi$. The fact that it was set in radians was the only feature which raised it from Standard Grade to Higher but candidates experienced difficulty with this.

Question 17 concerned a unit vector and more candidates identified $-3i + 4k$ as a unit vector than the number who chose the correct option.

Paper 1B

Question 22 was a routine vector question which was not answered as well as expected. Candidates also had difficulty in using the scalar product for perpendicular vectors.

Question 23 many candidates thought that $f(2x)$ was the same as $2f(x)$ although went on to access the marks for part (b).

Question 24 part (a) should have been accessible to most candidates, but many thought that

$\sin\left(\frac{\pi}{3} + \frac{\pi}{4}\right) = \sin\left(\frac{\pi}{3}\right) + \sin\left(\frac{\pi}{4}\right)$. This error was continued in part (c), resulting in a lower than anticipated average mark in this question.

Paper 2

Question 2 there were candidates who were unable to associate differentiation with composite functions and failed to gain any marks in part (b).

In question 3 there were candidates who did not recognise the cubic obtained in part (b) was the same as the cubic factorised in part (a).

Many candidates failed to solve the logarithmic equation. Candidates still find great difficulty in producing work such as $\log_2\left((x+3)(x^2+5x-4)\right) = 3 \Leftrightarrow (x+3)(x^2+5x-4) = 2^3$.

In question 4 there were many candidates who did not understand the meaning of "touch" and were unable to sketch the correct diagram.

In question 5, many candidates did not appreciate the significance of the coordinates of the points of intersection. Many candidates wasted time solving $\cos 2x = \frac{3}{7}$. In this particular question candidates also lost

marks because they mistakenly thought that $\int \cos x^\circ dx$ was $\sin x^\circ$.

In Question 7 on vectors, only around one third of the candidates coped with the distributive law in part (a). Candidates were expected to copy the diagram and add any "useful" lines such as the perpendicular from A onto DC. This, together with a mixture of right-angled trigonometry and vectors, is what raises part (a) above the level of grade C.

Some of the candidates who attempted part (b) thought that $|\mathbf{q} + \mathbf{r}| = |\mathbf{q}| + |\mathbf{r}|$.

Advice to centres for preparation of future candidates

Candidates should continue to be encouraged to complete tidy working for the objective questions. It would appear that more candidates are doing their working on the question paper as not so much was appearing in the examination booklet.

The two areas of the syllabus which had the poorest responses were Vectors and Trigonometric equations. More practice is recommended in the following two areas: the use of the scalar product in the case of perpendicular vectors and recognising basic trigonometric equations, with a reminder to candidates not to attempt to apply the double angle formula where it is not required - as in $\cos 2x = \frac{3}{7}$.

Centres should consider how best to prepare candidates to tackle extended response questions which assess problem solving skills. This preparation is required in order for candidates to access marks in the (b) or (c) parts of the questions in Paper 2 in particular.

Statistical information: update on Courses

Number of resulted entries in 2008	19633
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Number of resulted entries in 2009	19631
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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	22.2%	22.2%	4353	93
B	24.7%	46.9%	4852	77
C	22.8%	69.7%	4470	62
D	10.3%	80.0%	2029	54
No award	20.0%	100.0%	3927	-

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.