

22 October 2004

To: SQA Co-ordinator (Secondary Schools,
Special Schools and Further Education Colleges)
Scottish Executive
HMIE
Directors of Education
Mathematics Assessment Panel members
Higher Education Institutions – Department of Education

**For the attention of all staff responsible for the delivery of
National Qualifications in Mathematics**

Action by Recipient	
	Response required
✓	Note and pass on
	None – update/information only

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Dear Colleague

National Qualifications Update - Mathematics

This letter is the latest in the series of biannual update letters from SQA specifically designed to keep specialists in Mathematics abreast of developments in the subject area. I place a very high importance on liaison between SQA and practitioners and these letters form one strand of this communication strategy. In addition I can be contacted in a number of ways, with my direct dial and email address noted above.

1. Update on NQ Review recommendations.

Since the last update letter, the three NQ Review recommendations for Mathematics have progressed as follows:

(i) Course frameworks for Advanced Higher Mathematics and Advanced Higher Applied Mathematics

Advanced Higher Mathematics

The Advanced Higher Mathematics examination, based on the units Mathematics 1 (AH), Mathematics 2 (AH) and Mathematics 3 (AH), was successfully introduced for Diet 2004. The Principal Assessor for AH Mathematics reported on improved candidate performance in the examination, as reflected in the increased number of candidates achieving a C grade pass or better. It is the Principal Assessor's view, confirmed by discussions with Examining Team members and by scrutinizing marker reports, that improved performance could be attributed to a number of factors.

Centres are becoming more proficient at delivering the Course, and the absence of options within the AH Mathematics Course may have focussed the teaching within centres and contributed to the learning experience in a positive way for candidates. The new format of the examination paper, a flow of short questions designed mainly to test knowledge and understanding, followed by extended response questions which test problem solving skills, may also have contributed to improved candidate performance.

Advanced Higher Applied Mathematics

As indicated in a letter to centres (March 2004), the Advanced Higher Applied Mathematics examination in session 2004/05 will consist of two core Units (Statistics, Numerical Analysis or Mechanics), and a common component Unit *Mathematics for Applied Mathematics (AH)*. Candidates for Applied Mathematics (AH) will choose to enter for one of the Applied Mathematics options, Applied Mathematics: Statistics (AH) or Applied Mathematics: Numerical Analysis (AH), or Applied Mathematics: Mechanics (AH).

In Diet 2005 and thereafter, there will be an examination paper for each of the three Applied Mathematics options. The examination paper for Applied Mathematics: Numerical Analysis (AH) will list the required formulae (as listed in the NAB, and previously in the *Mathematical Formulae and Statistical Tables* booklet) at the front of the paper. Specimen Question Papers are available on both the NQ Mathematics and the NQ Applied Mathematics subject-specific pages of the SQA website (www.sqa.org.uk).

A revised Applied Mathematics (AH) Arrangements document can be accessed through both the NQ Mathematics and the NQ Applied Mathematics subject-specific pages of the SQA website (www.sqa.org.uk).

NABs have been written for the new Unit *Mathematics for Applied Mathematics (AH)* and can be accessed online on the Mathematics subject-specific pages of SQA's secure website. If you encounter any problems with the secure website, please have your SQA Co-ordinator get in touch with SQA's Customer Contact Centre by telephone: 0141 242 2214, or by email: customer@sqa.org.uk

(ii) Design of questions in examination papers in Mathematics

Higher Mathematics

As indicated in a letter to centres (September 2003), the mark allocation for the Higher Mathematics examination for Diet 2004 and thereafter, is as follows:

Paper 1 - 60 marks

- Time unchanged - 70 minutes

Paper 2 - 70 marks

- Time unchanged - 90 minutes

ie an overall increase in total marks from 110 to 130.

Statistics for Higher Mathematics candidates in Diet 2004, reveal an increased percentage of candidates achieving a C grade pass or better. It is pleasing to note that 30 candidates achieved full marks. The Principal Assessor reports that overall performance of candidates remains satisfactory and the increased percentage of candidates achieving a C grade pass or better is due to the additional marks awarded for demonstrated candidate evidence (where previously mark allocation was tight).

Objective Testing

Further work arising from the NQ Review of Mathematics led to the appointment of a consultant to investigate possible alternative forms of assessment. The research into alternative methodologies, techniques and design of questions used by other Awarding Bodies, and discussions with key personnel in Mathematics education, did not reveal any new strategies that might further improve the situation at this time. However, there is evidence to suggest that more efficient use of the time available for Mathematics examinations could be achieved by incorporating into the external assessment an appropriate form of objective testing.

A paper was presented to the Mathematics and Statistics Assessment Panel in May 2004 regarding the proposal to set up a Subject Advisory Group (SAG) to look at the potential benefits and to investigate the possible adoption of an element of objective testing into external assessment at some time in the future. The Panel endorsed the setting up of a SAG to take this development forward.

The SAG met on 8 September 2004 and the next meeting is scheduled for 13 December 2004. If you have a particular view or comments about the introduction of objective testing into external assessment that you would like to be passed on to the SAG, please contact me at the above address.

The deliberations and recommendations of the SAG, on the introduction of objective testing into external assessment, will be presented to, and discussed at, the next meeting of the Mathematics and Statistics Assessment Panel. Centres will be kept informed of progress of this development.

(iii) Advances in calculator technologies and capabilities

A document providing guidance on graphing calculator solutions to questions on roots and factors of polynomials and recurrence relations has been issued to centres (December 2003). Further documents extending the range of acceptable graphing calculator solutions to other topics will be issued in due course.

The 2004 Mathematics marking instructions on the SQA website refer, where appropriate, to acceptable graphing calculator solutions.

Graphing Calculator Questionnaire

The extent to which candidates have access to, and make effective use of graphing calculators in examinations is unclear, and this had prompted me to issue a questionnaire to all centres (October 2004). I fully appreciate the time constraints under which you operate, and I have tried to keep the information I have asked for to a minimum. However, I do require comprehensive feedback to construct an accurate profile of current activity in this area and views on the way ahead. I look forward to receiving your responses. For your convenience an electronic version of the questionnaire is available on the NQ Mathematics subject-specific page of the SQA website.

2. Principal Assessor and Senior Moderator Reports

The Principal Assessor (PA) and Senior Moderator (SM) reports for the 2004 diet of examinations will be placed on the SQA website this month.

Please refer to the individual PA reports for statistical information about the examinations and full and detailed comments on candidate performance. Each PA report specifies areas of external assessment in which candidates performed well and areas of external assessment in which candidates had difficulty.

It is important that candidates are entered for the appropriate Course, at the appropriate level. The PA report for Higher shows that 4 391 candidates (out of 19 385 candidates in total) achieved No Award and furthermore, 1 000 candidates failed to score 20%. The PA report for Intermediate 1 suggests that, for some candidates, a more appropriate option would be Course C101 Maths 1, 2 and Applications. The PA report for Standard Grade reported, as indicated last year, that some candidates, (possibly very good General students) were presented for the Credit exam with only a limited knowledge of Credit work. Results were invariably disappointing.

The SM report identifies specific issues arising from central moderation and includes general comments on the moderation activity and feedback to centres.

3. Use of brackets in Higher Mathematics examinations

You will have noticed in the Higher Mathematics examination papers for Diets 2002, 2003 and 2004, brackets were introduced to trigonometric and logarithmic expressions of the form:

$$\begin{array}{lll} \sin (x^\circ) & \cos (2x^\circ) & \sin (2p) \\ \log_e (4) & \log_e (3x) & \log (x) \end{array}$$

It was felt that the introduction of the brackets would support candidates and reflect the use of brackets in accessing the technology ie calculators, PASSIT etc.

In response to queries and requests for clarification regarding the use of brackets in examinations, I have brought this matter to the attention of the Principal Assessors (Advanced Higher, Higher, Intermediate 2, Intermediate 1 and Standard Grade) for Mathematics, and the Mathematics and Statistics Assessment Panel. The Panel considered a number of issues surrounding this topic, including the teaching and learning of notation in centres, the use of brackets in standard textbooks, the impact of technology, and the views of Principal Assessors. They determined and made the recommendation, which I endorse, that **in and after Diet 2005** brackets would not be used for expressions of the form:

$$\begin{array}{lll} \sin x^\circ & \cos 2x^\circ & \sin 2p \\ \log_e 4 & \log_e 3x & \log x \end{array}$$

Brackets will continue to be used in normal convention as is currently the case in NABs, standard textbooks etc. For example:

$$\begin{array}{l} \sin (2x^\circ + 30^\circ) \\ \log (4x + 1) \end{array}$$

Please get in touch with me at the above address if you require further clarification on this matter.

4. Intermediate 1 and Intermediate 2 Courses

In Diet 2004 there were a few centres where a number of candidates for the Intermediate 1 and Intermediate 2 examinations were presented with the incorrect question paper. This was mainly due to one of two reasons:

either candidates were entered under the incorrect code by the centre and the “incorrect” examination question paper was supplied;

or where centres had entered candidates for both options and the Chief Invigilator gave out the incorrect examination question paper to candidates.

Codes and titles for entry to Courses in Mathematics with optional routes are used to reflect the options chosen by candidates and ensure the correct examination paper is available for each candidate on the day of the exam. In Intermediate 1 and Intermediate 2 Mathematics Courses the codes for the optional routes are:

Intermediate 1

- C100** 10 Mathematics: Maths 1, 2 and 3
C101 10 Mathematics: Maths 1, 2 and Applications

Intermediate 2

- C100** 11 Mathematics: Maths 1, 2 and 3
C101 11 Mathematics: Maths 1, 2 and Applications.

For each of the Intermediate 1 and Intermediate 2 examinations, there are two distinct question papers; one for those candidates entered for Course C100, and one for candidates entered for Course C101. The codes detailed above must be used, to ensure that the appropriate question paper is available for candidates on the day of the examination for each of the optional routes.

By **24 February 2005** you should ensure that candidates are entered for the correct National Qualification ie **C100** or **C101**, and advise SQA of any changes of Course. Course entries or amendments are possible without late entry charges up to **31 March 2005**. (Details in the *Operational Guide for Schools 2004/2005*, available on the SQA website, www.sqa.org.uk.)

In centres where there are candidates entered for both options, it would be useful to draw this to the attention of the Chief Invigilator prior to the examination.

I would ask for your support and vigilance in this matter.

5. Progression route to Higher Mathematics

Some centres are using Intermediate 2 as a progression route to Higher. Candidates progressing through this route were:

- in 2002, 1624 candidates
- in 2003, 1818 candidates
- in 2004, 1842 candidates

The number of centres who opt to replace Standard Grade Mathematics with Intermediate 2 is rising and the increase is expected to continue next year and in future years.

Success at Higher depends heavily on a full and in depth understanding and competence in the algebraic content of Standard Grade Credit level or Intermediate 2. Teachers of Standard Grade Credit level or Intermediate 2 students intending to progress to Higher are advised to give more attention to algebraic content than the minimum necessary for success in the Standard Grade Credit level or Intermediate 2 examinations.

In previous update letters, progression data for candidates from Standard Grade and Intermediate 2 to Higher was provided. The progression data for 2004 Standard Grade and Intermediate 2 to Higher candidates is included in **Appendix 1** of this letter.

6. Mark Allocations in Question Papers

There have been a number of changes to the mark allocations for individual question papers over the last few examination diets. I would like to take this opportunity to confirm that the total mark allocation for Mathematics question papers in and after Diet 2005 will be as follows:

Mathematics: Intermediate 1 Paper 1	30 marks
Mathematics: Intermediate 1 Paper 2	50 marks
Mathematics: Intermediate 2 Paper 1	30 marks
Mathematics: Intermediate 2 Paper 2	50 marks
Mathematics: Higher Paper 1	60 marks
Mathematics: Higher Paper 2	70 marks
Mathematics: Advanced Higher	100 marks
Applied Mathematics: Advanced Higher	100 marks

In Standard Grade examination papers, marks are allocated to the individual elements Knowledge and Understanding (KU), and Reasoning and Enquiry (RE) across the two question papers. The total mark allocation for the individual elements in and after Diet 2005 will be as follows:

Foundation: KU	40 marks
Foundation: RE	40 marks
General: KU	40 marks
General: RE	40 marks
Credit: KU	45 marks
Credit RE	45 marks

7. CPD workshops

SQA is again offering professional development workshops in Mathematics, aimed at helping teachers and lecturers understand the standards that National Qualifications are based on. In the second year of the programme, workshops were held during August in Edinburgh and during October in Stirling. A third workshop will be held on 6 November in Glasgow.

The workshops are led by the Principal Assessor for Higher Mathematics and supported by members of the Examining team. They provide a mixture of practical inputs and discussion opportunities.

Feedback from the well-attended workshops has been positive.

8. Appeals 2004

The number of Appeals against this year's exam results is significantly down compared with last year and it is pleasing to note that the success rate for Appeals has increased.

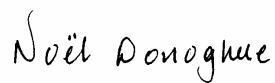
I would like to take this opportunity to remind you of two publications which centres would find helpful to refer to when preparing and collating evidence for Appeals purposes.

On SQA's secure website, you can access the publication pack *Exemplification of Appeals: Mathematics*, June 2004. The pack is designed to support teachers and lecturers of mathematics in submitting evidence to support appeals. If you encounter any problems with the secure website, please have your SQA Co-ordinator get in touch with SQA's Customer Contact Centre by telephone: 0141 242 2214, or by email: customer@sqa.org.uk

I would also direct you to the NQ Mathematics subject-specific page of the SQA website (www.sqa.org.uk) and the publication *Estimates, Absentees and external Assessment Appeals: guidance on evidence requirements* April 2004. The publication provides guidance (both generic and subject-specific) for centres which are delivering National Courses.

I hope you find the information in this letter helpful. If you require any further clarification please do not hesitate to contact me.

Yours faithfully



Noël Donoghue
Qualifications Manager
Mathematics and Science

Higher Mathematics 2004 Pre-Appeal data

2004 Higher Mathematics candidate entries by Qualification level attempted in 2003

Qualification level attempted in 2003	Entries	%
SG Mathematics	13,426	69
Intermediate 1 Mathematics	3	0
Intermediate 2 Mathematics	1,842	9
Higher Mathematics (resit)	2,627	14
No previous record in 2003	1,487	8
Totals	19,385	100

2004 Higher Mathematics results of candidates progressing from Standard Grade Mathematics in 2003

	Higher										Total
	A		B		C		D	No award		No result	
	1	2	3	4	5	6	77	8	9		
Standard Grade 1	1,515	2,132	1,093	1,374	1,059	919	516	312	299	72	9,291
2	7	71	124	311	438	674	600	575	893	146	3,839
3	0	0	2	7	19	30	48	51	110	22	289
4	0	0	0	0	0	0	1	0	3	0	4
5	0	0	0	0	0	0	0	0	2	1	3
Total	1,522	2,203	1,219	1,692	1,516	1,623	1,165	938	1,307	241	13,246

	Higher										Total
	A		B		C		D	No award		No result	
	1	2	3	4	5	6	77	8	9		
Standard Grade 1	16%	23%	12%	15%	11%	10%	6%	3%	3%	1%	100%
2	0%	2%	3%	8%	11%	18%	16%	15%	23%	4%	100%
3	0%	0%	1%	2%	7%	10%	17%	18%	38%	8%	100%
4	0%	0%	0%	0%	0%	0%	25%	0%	75%	0%	100%
5	0%	0%	0%	0%	0%	0%	0%	0%	67%	33%	100%
Total	11%	16%	9%	13%	11%	12%	9%	7%	10%	2%	100%

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Intermediate 2 Mathematics	1,842	9
Higher Mathematics (resit)	2,627	14
No previous record in 2003	1,487	8
Totals	19,385	100

2004 Higher Mathematics results of candidates progressing from Intermediate 2 Mathematics in 2003

Intermediate 2	Higher										Total
	A		B		C		D	No award		No result	
	1	2	3	4	5	6	77	8	9		
A	16	35	42	70	90	162	149	146	208	49	967
B	0	3	7	20	28	60	85	105	213	35	556
C	0	0	0	1	4	14	28	47	138	27	259
Compensatory	0	0	0	0	0	2	4	6	13	2	27
No Award	1	0	0	1	2	2	1	4	14	8	33
Total	17	38	49	92	124	240	267	308	586	121	1,842

Intermediate 2	Higher										Total
	A		B		C		D	No award		No result	
	1	2	3	4	5	6	77	8	9		
A	2%	4%	4%	7%	9%	17%	15%	15%	22%	5%	100%
B	0%	1%	1%	4%	5%	11%	15%	19%	38%	6%	100%
C	0%	0%	0%	0%	2%	5%	11%	18%	53%	10%	100%
Compensatory	0%	0%	0%	0%	0%	7%	15%	22%	48%	7%	100%
No Award	3%	0%	0%	3%	6%	6%	3%	12%	42%	24%	100%
Total	1%	2%	3%	5%	7%	13%	14%	17%	32%	7%	100%