

13 November 2003

To: Head of Centre
SQA Co-ordinator
Scottish Executive
Local Authority — SQA Coordinator

**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

Contact Name: Noël Donoghue at Glasgow
Direct Line: 0141-242 2152
E-mail: noel.donoghue@sqa.org.uk

Dear Colleague

National Qualifications Update — Mathematics

I'd like to take this opportunity to introduce myself and make contact with you as the recently appointed Qualifications Manager for Mathematics and Science.

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 e-mail address noted above.

Many of you will be aware that Charlie Penman has moved on, and is now the Business Manager for Mathematics and Science in SQA. You will also be aware of the contribution that Jim McAnally has made in his role as acting QM for Mathematics over the years and I would like to thank Jim for his work in this area. Jim is continuing to work for SQA as a consultant, and is currently co-ordinating the work of the Advanced Calculator Working group. Thanks also to Louise Lilley for her work as Qualifications Officer in the Mathematics and Science team. Louise is now working with the Business and Technology team. The new Qualifications Officer for Mathematics is Jayne Terzza, who has moved from a similar post in the Business and Technology team to join the Mathematics and Science team.

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

As indicated in a letter to centres, dated 30 January 2003, the Advanced Higher Mathematics examination for Diet 2004 will be based on the Units Mathematics 1 (AH), Mathematics 2 (AH) and Mathematics 3 (AH) only. There will be no Statistics, Mechanics or Numerical Analysis options.

There will be a single question paper with no sections, covering the content of Mathematics 1 (AH), Mathematics 2 (AH) and Mathematics 3 (AH).

A revised Advanced Higher Mathematics Arrangements document, which takes account of these structural changes, can be accessed through the NQ Mathematics subject page of SQA's website (www.sqa.org.uk).

Statistics 1 (AH), Mechanics 1 (AH) and Numerical Analysis 1(AH) will continue to be available as free standing Units and as component Units of Advanced Higher Applied Mathematics.

Advanced Higher Applied Mathematics

There will be **NO** changes to the Advanced Higher Applied Mathematics framework or examination for session 2003/04.

In session 2004/05, there will be three discrete Advanced Higher Applied Mathematics Courses. These will consist of:

- ◆ *Applied Mathematics: Mechanics*
Units: Mechanics 1, Mechanics 2 and Mathematics for Applied Mathematics
- ◆ *Applied Mathematics: Numerical Analysis*
Units: Numerical Analysis 1, Numerical Analysis 2 and Mathematics for Applied Mathematics
- ◆ *Applied Mathematics: Statistics*
Units: Statistics 1, Statistics 2 and Mathematics for Applied Mathematics

The common Mathematics for Applied Mathematics unit, which consists of content selected from Mathematics 1 (AH), Mathematics 2 (AH) and Mathematics 3 (AH) Units, is currently at final draft stage, as is the associated NAB.

Centres will be provided with full details of the new Unit and corresponding NAB in due course.

ii **Design of questions in Mathematics examination papers**

There are two distinct strands to be updated:

- (a) Increasing the total number of marks awarded for Higher Mathematics.

The decision to increase the total number of marks awarded for Higher Mathematics was taken in response to a research project carried out by the Principal Assessor of Higher Mathematics. For more detailed information about the project, please refer to Appendix 1 of this letter.

In the letter to centres dated 1 September 2003, centres were informed that, in and after the 2004 diet of examinations, the mark allocation for the Higher Mathematics examination will be as follows:

Paper 1 — Increase in marks from 50 to 60
Time unchanged — 70 minutes

Paper 2 — Increase in marks from 60 to 70
Time unchanged — 90 minutes

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

The amended version of the 2003 Higher Mathematics marking instructions, referred to in the letter, is attached as Appendix 2 and is also available on SQA's website (www.sqa.org.uk). These amended marking instructions show where an additional 20 marks could have been allocated to the 2003 Higher Mathematics examination. Centres may wish to use these amended marking instructions as a model on which to base the construction of prelim papers with a total mark of 130 for the 2004 Higher Mathematics examination.

- (b) Updating the Additional Question Banks at Higher, Intermediate 1 and 2 and Advanced Higher

SQA has undertaken to update the Additional Question Banks that were originally issued through the Higher Still Development Programme, by incorporating past paper questions, question analysis and marking schemes from the examinations which have taken place since the banks were issued. The new item bank material will cover Intermediate 1, Intermediate 2, and Higher Mathematics. It will include all of the past paper questions from 2000 to 2002, and will indicate for each question the designated level, C or A/B.

This is intended to assist centres in the preparation of prelims, and in generating estimates and appeals evidence. We hope you will find these additional question bank items useful, and SQA will issue updates to the question banks in due course.

iii **Advances in calculator technologies and capabilities**

Accompanying the update letter to centres dated 25 November 2002, was a document referring to acceptable calculator solutions to examination questions. The document

was a re-issue of the Appendix document distributed in October 1992, by the then Scottish Examination Board, clarifying the amendment to rubric of Higher Papers I and II for examinations in and after 1993.

The point of re-issuing the document at that time was to emphasise that for some examination questions graphing calculator solutions are acceptable. The letter indicated that further acceptable graphing calculator solutions to examination questions were under consideration by the Advanced Calculator Working Group. A document providing guidance on graphing calculator solutions to questions on roots and factors of polynomials and recurrence relations is about to be issued to centres. Further documents extending the range of acceptable graphing calculator solutions to other topics will be issued in due course.

The 2003 Intermediate 2 and Higher Mathematics marking instructions, available to download from SQA's website (www.sqa.org.uk) both refer to acceptable graphing calculator solutions.

2. Principal Assessor and Senior Moderator Reports

The Principal Assessor (PA) and Senior Moderator reports for the 2003 diet of examinations are available to download from SQA's website (www.sqa.org.uk). Please refer to the individual PA reports for statistical information about the examinations, and comments on examination performance. Each PA report details areas of external assessment in which candidates performed well, and areas of external assessment in which candidates had difficulty.

The marking instructions for each examination are also on SQA's website.

3. Question 11 in Standard Grade Credit examination

The above question contained an unintentional mixture of units which rendered the question invalid according to the Conditions and Arrangements for Credit level Mathematics. Due to the unintentional use of a mixture of units, the decision was taken to disregard Q11, and the total number of marks for the Credit examination was reduced. This had no overall effect on candidate performance. Can I take this opportunity to once again restate that every effort was made to ensure that no candidate was disadvantaged.

4. Progression route to Higher Mathematics

Some centres are using Intermediate 2 as a progression route to Higher. In 2000, 1,617 candidates, in 2001, 1,624 candidates and in 2003, 1,818 candidates came through to Higher by this route.

Centres that opt to replace Standard Grade Mathematics with Intermediate 2 are relatively few, but informal feedback from centres indicates the number of candidates are increasing and this trend is expected to continue in the future.

Centres are reminded that success at Higher depends heavily on full understanding and competence in the algebraic content of Standard Grade Credit or Intermediate 2 Courses. Teachers of Standard Grade Credit or Intermediate 2 candidates who intend to progress to Higher are advised to give appropriate attention to algebraic content.

In the update letter of 25 November 2002, the 2000 and 2001 progression data for candidates from Standard Grade and Intermediate 2 to Higher was provided. The progression data for 2003 Higher Mathematics candidate entries is included in Appendix 3 of this letter.

5. Proposed Advanced Higher Mathematics and Applied Mathematics Conference

Due to the changes in the Advanced Higher Mathematics and Applied Mathematics frameworks, the Mathematics and Statistics Assessment Panel suggested holding a Conference in the spring of 2004. The purposes of this conference would be to look at the effects of the change to the Advanced Higher Mathematics framework for session 2003/04, and the effects of the change to the Advanced Higher Applied Mathematics framework for session 2004/05.

It would be useful for planning purposes to gauge the level of interest for such an event. Therefore, please contact me or Jayne Terzza (telephone: 0141-242 2203, or e-mail: jayne.terzza@sqa.org.uk) to indicate the number of teachers from your Centre who may wish to attend such a conference.

Additionally, if there are any areas you would specifically like to be covered, please get in touch with me or Jayne.

6. CPD workshops

SQA has offered professional development workshops in Mathematics, aimed at helping teachers and lecturers understand the standards that National Qualifications are based on. Two workshops were held during August, in Aberdeen and Edinburgh, and a third during October in Glasgow.

The workshops were led by the PA for Higher Mathematics, and supported by members of the Examining team. They provided a mixture of practical inputs and discussion opportunities.

Feedback from the well-attended workshops has been positive, and it is planned to continue and expand the programme in 2004/05.

7. Understanding Standards — PASS-IT project

PASS-IT is a Scottish Executive funded project involving SQA, LTS, SFEU, BBC Scotland and SCROLLA (Scottish Centre for Research into Online Learning and Assessment). The project seeks to create, pilot and evaluate approaches to ICT-based assessment for a number of subjects in schools and colleges throughout Scotland.

Phase 1: August 2002 – October 2003

ICT-based assessments were developed for a number of Mathematics NABs at Higher and Advanced Higher level, and piloted for Unit 2 at Higher level, and Unit 1 at Advanced Higher level. Data from the pilots is currently being analysed and a research report will be published in the autumn.

Phase 2: November 2003 – October 2004

Phase 2 will seek to further develop assessment technologies to enable a range of ICT-based assessments for Mathematics NABS at Access 2 and 3, and Intermediate 1 and 2 levels. One Unit will be developed and piloted at each level.

Also as part of Phase 2, and in response to positive feedback from participating centres in Phase 1, ICT-based assessment material for Unit 2 at Higher level will be available to some of these centres with a view to generating alternative evidence for candidates. The Senior Moderator for Mathematics is liaising with the project and the centres to monitor progress.

If you would like further information about the development and piloting of ICT-based assessments for Mathematics NABS, or wish to be involved at Access 2 and 3, or Intermediate 1 and 2 levels, please contact Jayne Terzza (telephone: 0141-242 2203, or e-mail jayne.terzza@sqa.org.uk).

For more information about the PASS-IT project please visit the following website: **www.pass-it.org.uk**.

8. NABs online

From 1 September 2003 centres have been able to access NAB materials online on a secure section of SQA's website.

To enter the secure website, you will need to know your centre's unique username and password. For security reasons the website address and username and password have been e-mailed to your SQA Co-ordinator, provided they have responded to communications from SQA's Customer Contact Centre about NABs online.

If you encounter any problems with the secure area of the website, or do not have a username and password in your centre, please have your SQA Co-ordinator get in touch with SQA's Customer Contact Centre:

Tel: 0845 279 1000

Fax: 0141 242 2244

E-mail: customer@sqa.org.uk

9. Appeals 2003

The number of appeals against this year's exam results is significantly down compared with last year. A major reason behind the reduction is the increased number of candidates who achieved their estimate.

Experience from the Appeals procedures this year indicates that some centres are still submitting inadequate evidence in support of appeals. The Examiner must be sufficiently persuaded by the quality and quantity of the evidence to improve the award to the estimate grade.

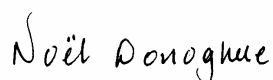
I would like to take this opportunity to draw your attention to a number of letters and publications relating to Appeals issued by SQA over the last few years.

1. *Guidance on generating evidence for National Course estimates and assessment appeals*, issued in February 2001.
2. The letter from Hugh Gordon dated 15 February 2002 and containing *Notes of guidance for centres on the appeals process and on the preparation of evidence to support estimates and appeals*. (These notes are intended to be used in conjunction with the Guidance document referred to above.)
3. The letter from Tom Drake dated 13 February 2003 referring to *Note of guidance for centres on the use of commercially-produced examination papers*.
4. *Exemplification of Appeals: Intermediate 2 and Higher Appeals*, 1st edition, February 2003.

When submitting evidence for appeals purposes, centres may wish to clearly identify the sources from which questions are drawn. For example, for an SQA past paper, an indication of the year, paper number, and question number, and if the question has been modified. This will greatly assist the Examining team in making a judgement of the suitability and reliability of the evidence.

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

Yours faithfully



Noël Donoghue
Qualifications Manager
Mathematics and Science

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Appendix 1

Higher Mathematics Research Project

In Autumn 2002, SQA carried out an investigation into the fall of 4.7% in the pass rate in Higher Mathematics in the 2002 diet of examinations.

One of the recommendations arising from this investigation was to conduct a research project on the effect of increasing the number of marks available for the Higher Mathematics examination.

A consultant was commissioned to amend the 2002 Higher Mathematics marking instructions to accommodate additional marks and to re-mark a sample of scripts according to the amended marking scheme.

The consultant liaised with the setters of the 2002 Higher examination and, arising from a careful study of the marking instructions for the examination, an additional 20 marks were allocated where the mark allocation was tight and where, if allowed, a half mark could have been awarded within the total of 110 marks. The insertion of additional marks was done in such a way that it allowed candidates to access those marks appropriate to their level of ability — it did not make questions easier.

The number of marks in Paper 1 increased from 50 to 61 and the marks for Paper 2 increased from 60 to 69. The total mark on the amended marking instructions was thereby raised to 130 and the cut-off marks for C, B and A awards were adjusted upwards proportionally.

For the sample of scripts, it was decided to select at random the Paper 1 and Paper 2 scripts of 10 candidates scoring each total mark in a range of totals from D awards to A awards. This range of scores was considered to be sufficient to reveal the effect of the increased number of marks on the grades awarded to candidates. The Table below shows the projected grade movements on extrapolating from the sample of candidates to the 2002 cohort of 19,821 candidates on the basis of the re-mark.

Grade achieved	Diet 2002 Total no of candidates	Diet 2002 & of candidates	Projected figures	
D or less	7155	36.1%	6689	33.7%
C	4860	24.5%	4888	24.7%
B	4201	21.2%	4652	23.5%
A	3605	18.2%	3592	18.1%
totals	19821		19821	
pass rate		63.9%		66.3%

At each of the scores, the mean mark increased significantly. This would have enhanced the sense of achievement and satisfaction amongst those candidates.

With a projected 557 candidates moving from fail to grade C and a projected 91 candidates moving from grade C to fail, the net result would be a projected increase in the pass rate of 2.4% as shown in the table above.

Appendix 2

Higher Mathematics Finalised Marking Instructions 2003

In and after the 2004 diet of examinations, the total number of marks for the Higher Mathematics examination will increase from 110 to 130. There will be **NO** other changes to the format of the examination.

To provide guidance to centres on how the additional marks will be allocated, additional pages have been added to the following 2003 Marking instructions to show how an additional 20 marks could have been allocated to the 2003 examination.

This file is available to download from the NQ Mathematics subject-specific web page of SQA's website (www.sqa.org.uk) as a PDF document. Alternatively, you can access the file directly at the following address:

- ◆ www.sqa.org.uk/files_ccc/03miMathsH.pdf

Appendix 3

2003 Higher Mathematics candidate entries by qualification level attempted in 2002

Qualification level attempted in 2002	Entries	%
Standard Grade Mathematics	13,702	69%
Intermediate 1 Mathematics	0	0%
Intermediate 2 Mathematics	1,818	9%
Higher Mathematics (re-sit)	2,899	15%
No previous record in 2002	1,542	8%
Total	19,961	100%

Progression in Mathematics: Intermediate 2 (2002) to Higher (2003)

		Higher Mathematics Result 2003 (Pre-Appeal)										Total
		A		B		C		Comp	No Award		No Result	
		1	2	3	4	5	6	76	8	9	No Result	
Int 2 Mathematics Result 2002	A	13	35	50	74	114	127	143	172	303	42	1,073
	B	0	1	2	14	16	31	41	78	221	36	440
	C	0	0	0	2	7	7	23	29	156	33	257
	Comp	0	0	0	1	1	0	1	3	11	8	25
	No Award	0	0	0	1	1	0	2	2	13	4	23
Total		13	36	52	92	139	165	210	284	704	123	1,818

		Higher Mathematics Result 2003 (Pre-Appeal)										Total
		A		B		C		Comp	No Award		No Result	
		1	2	3	4	5	6	76	8	9	No Result	
Int 2 Mathematics Result 2002	A	1%	3%	5%	7%	11%	12%	13%	16%	28%	4%	100%
	B	0%	0%	0%	3%	4%	7%	9%	18%	50%	8%	100%
	C	0%	0%	0%	1%	3%	3%	9%	11%	61%	13%	100%
	Comp	0%	0%	0%	4%	4%	0%	4%	12%	44%	32%	100%
	No Award	0%	0%	0%	4%	4%	0%	9%	9%	57%	17%	100%
Total		1%	2%	3%	5%	8%	9%	12%	16%	39%	7%	100%

Progression in Mathematics: Standard Grade (2002) to Higher (2003)

		Higher Mathematics Result 2003 (Pre-Appeal)										Total
		A		B		C		Comp	No Award		No Result	
		1	2	3	4	5	6	76	8	9	No Result	
SG Mathematics Result 2002	1	1,369	2,229	1,215	1,354	1,097	842	489	325	253	37	9,210
	2	6	95	156	312	520	634	687	590	1,009	148	4,157
	3	0	2	3	11	19	35	33	42	149	25	319
	4	0	0	0	0	2	1	3	1	5	4	16
Total		1,375	2,326	1,374	1,677	1,638	1,512	1,212	958	1,416	214	13,702

		Higher Mathematics Result 2003 (Pre-Appeal)										Total
		A		B		C		Comp	No Award		No Result	
		1	2	3	4	5	6	76	8	9	No Result	
SG Mathematics Result 2002	1	15%	24%	13%	15%	12%	9%	5%	4%	3%	0%	100%
	2	0%	2%	4%	8%	13%	15%	17%	14%	24%	4%	100%
	3	0%	1%	1%	3%	6%	11%	10%	13%	47%	8%	100%
	4	0%	0%	0%	0%	13%	6%	19%	6%	31%	25%	100%
Total		10%	17%	10%	12%	12%	11%	9%	7%	10%	2%	100%