



Course Report 2017

Subject	Mathematics
Level	Advanced Higher

The statistics used in this report have been compiled before the completion of any Post Results Services.

This report provides information on the performance of candidates which it is hoped will be useful to teachers, lecturers and assessors in their preparation of candidates for future assessment. 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 assessment documents and marking instructions.

Section 1: Comments on the assessment

Summary of the course assessment

Component 1: question paper

The question paper consisted of 18 written response questions with a total mark of 100. It was similar in structure to the Specimen Question Paper and to the previous year's paper, although the final two questions were slightly shorter. One topic was assessed for the first time.

Overall, the question paper performed very closely to expectations. Feedback from the marking team and practitioners suggested that the paper was fair in terms of coverage, level of demand and accessibility.

The level of demand was a little greater than in the previous year, and this was taken into account when setting the grade boundaries.

Section 2: Comments on candidate performance

Candidates generally showed good preparation, and most had thoroughly practised routine techniques and procedures. In questions where earlier results were needed to produce a final answer, candidates who had made a mistake often showed persistence in following through.

The vast majority of candidates attempted at least some part of every question.

Lack of care caused several problems, for example missing brackets or not checking to see whether an integral was on the formula sheet. There were errors in basic algebra.

Some topics, assessed at unit level, had not seen sufficient revision.

Areas in which candidates performed well

Component 1: question paper

- Question 1: Binomial Expansion
- Question 2: Partial Fractions
- Question 3: Differentiation of Quotient
- Question 4 (a): Arithmetic Sequence
- Question 5 (a): Gaussian Elimination
- Question 8: Euclidean Algorithm

Question 17 (a): Conjugate Root

Areas which candidates found demanding

Component 1: question paper

- Question 7: Although most candidates were able to handle the discriminant of a 2 by 2 matrix, many were unable to find the inverse or transpose. Errors in matrix multiplication were common.
- Question 9: Variable separable differential equations are assessed at unit level, and the relevant integral here is given in the formula sheet, yet many candidates did not handle this question well.
- Question 10: The formula sheet was of assistance in the first part of the summation question but the subsequent simplification was not generally well done. Part (b) was expected to be challenging, and so it proved.
- Question 11: The process of logarithmic differentiation was generally carried out well but several candidates caused themselves problems by omitting the brackets when multiplying by the exponent.
- Question 12: Only a minority of candidates were able to demonstrate understanding of the graphical interpretation of an odd function. Part (c) required a high degree of understanding and precision and few candidates managed to obtain all the elements.
- Question 13: Proof by contrapositive made its first appearance in a course assessment. Although it featured in the Specimen Question Paper, it presented difficulties for candidates. A number confused it with proof by contradiction, and many were simply unable to sequence the steps in a logical proof. Some candidates could not give the general form of an odd integer.
- Question 14: Second-order linear differential equations have appeared in recent course and unit assessments, and candidates generally handled the process well. Several candidates were unable to process (or omitted) the particular integral, and algebraic errors were common.
- Question 15: In part (a), many candidates were unable to obtain the parametric equations of a line. In part (b), several candidates found the vector product of two position vectors rather than a pair of vectors parallel to the plane. In part (c), a minority of candidates were able to show how to find the intersection of a line and a plane. Several candidates, however, showed remarkable persistence in following through from erroneous results in earlier parts of the question.

- Question 16: Many candidates did not know how to find the volume of revolution round the y-axis, often using the formula for the x-axis. When taking the square root of an expression involving the sum of two terms, several candidates expressed this as the sum of the individual square roots.
- Question 17: Perhaps because of the unknown constant, many candidates resorted to synthetic division rather than (or, in some cases, before) forming a quadratic factor and using algebraic long division.
- Question 18: The formula for instantaneous speed is prominent in the support notes and is assessed at unit level, but few candidates were able to reproduce it. Many candidates found it very difficult to relate the diagram to the equations in part (b).

Section 3: Advice for the preparation of future candidates

Component 1: question paper

- ◆ Candidates were well prepared for the assessment and it is clear that they had been very well supported by centres. Good use had been made of published materials and resources, including Understanding Standards.
- ◆ There was evidence that many techniques and routines had been thoroughly revised to ensure familiarity and understanding.
- ◆ Proof continues to present difficulties, and candidates would benefit from clear feedback in this area, including the importance of language and sequencing.
- ◆ Many candidates omitted necessary brackets, and it was uncommon to see candidates using appropriate vector notation. Early emphasis on notation is essential to ensure that communication is effective and mistakes are minimised.
- ◆ It would be useful to ensure that candidates are confident in carrying out algebraic long division.
- ◆ It would be beneficial to candidates if they were to develop the habit of checking the formula list, especially when integrating. This would avoid the loss of time as well as the particular mark.
- ◆ Candidates still find graphicacy challenging, especially in the context of odd/even functions. With continued practice, it is hoped that there will be a gradual improvement.

Grade Boundary and Statistical information:

Statistical information: update on Courses

Number of resulted entries in 2016	3356
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Number of resulted entries in 2017	3586
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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 -				
A	37.2%	37.2%	1333	71
B	20.3%	57.5%	729	60
C	17.0%	74.5%	610	49
D	8.1%	82.6%	289	43
No award	17.4%	-	625	-

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.