



Course report 2019

Subject	Mathematics
Level	Advanced Higher

This report provides information on candidates' performance. Teachers, lecturers and assessors may find it useful when preparing candidates for future assessment. The report 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.

The statistics used in this report have been compiled before the completion of any post-results services.

Section 1: comments on the assessment

Question paper

Feedback from the marking team and teachers and lecturers suggests that the paper was fair in terms of coverage and level of demand, and it was accessible to candidates.

Candidate performance suggests that the level of demand was higher than the previous year, resulting in grade boundaries being adjusted accordingly.

Section 2: comments on candidate performance

Candidates generally showed good preparation and most seem to have thoroughly practised routine techniques and procedures.

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

As in the previous year, candidates used the formula sheet effectively.

Lack of care continued to cause problems, for example transcription and basic algebraic errors, as well as missing brackets.

Many candidates found great difficulty in communicating explanations and logical processes. Errors in basic terminology were common.

Areas that candidates performed well in

Question paper

Question 1	product rule, quotient rule and differentiation of inverse function
Question 2 (a), (b)	determinant, matrix multiplication
Question 5 (a)	first derivative for a curve defined parametrically
Question 8	homogeneous second-order linear differential equation
Question 10 (a)	implicit differentiation
Question 16 (a)	integration by parts
Question 18 (b) (i)	complex numbers — this part of the course generally presents a major challenge, but many candidates performed relatively well

Areas that candidates found demanding

Question paper

Question 2 (c)	Explanation as to why a particular matrix had no inverse The majority of candidates did not state the general condition for a matrix to have an inverse.
Question 3 (b)	Sketching a graph Many candidates lost the mark for this question due to lack of care when drawing their diagram.
Question 5 (b)	Second derivative where a curve is defined parametrically

The majority of candidates could not produce a valid strategy for finding the second derivative. Where candidates attempted to use a formula based on the quotient rule, many produced an incorrect formula or were unable to complete the algebraic manipulation that followed.

Question 7

Summation

In part (a), only a minority of candidates could produce a formula for a simple sum that was not given on the formula list. In part (b), candidates continued to have difficulty in handling partial sums.

Question 10 (b)

Interpreting tangents to a curve defined implicitly

Most candidates simply equated the derivative to zero rather than investigating the condition for the derivative to be undefined.

Question 11 (b)

Proof by contrapositive

In part (i), the majority of candidates were unable to give the contrapositive of a conditional statement. In part (ii), relatively few candidates could give a complete and satisfactory definition of an even positive integer.

Question 13

Differential equation

Although this question was generally well done, many candidates did not separate variables and attempted integration of two variables with respect to one. It was common for candidates to omit the negative sign when integrating with respect to V .

Question 15 (a)

Equation of a line of intersection of two planes

Insufficient or incorrect communication caused many candidates to lose a mark in verifying that a given line was the line of intersection of two given planes.

Question 17

Geometric sequence

In part (a), the majority of candidates treated this question as if it was given that the sequence was geometric, and therefore investigated only one pair of terms rather than two pairs. In part (c) (i), very few candidates attempted to establish an algebraic expression for the common ratio in order to produce the required verification of the given quadratic equation.

Section 3: preparing candidates for future assessment

Question paper

In general, candidates were well prepared for the assessment. Good use had been made of published materials and resources, including Understanding Standards materials. Some candidates produced excellent and insightful answers for the more challenging questions.

There was evidence that many techniques and routines had been thoroughly revised to ensure candidates' familiarity and understanding. Teachers and lecturers should continue to encourage this.

Proof, including induction, still presents difficulties, and candidates would benefit from clear feedback in this area. Teachers and lecturers should emphasise the need to specify source sets when giving the form of, for example, an even number.

In questions where candidates are asked to show that a certain result is true, teachers and lecturers should ensure candidates know that justification must be clear, detailed and demonstrate understanding. Questions 2 (c), 15 (a), 17 (a) and 17 (c) (i) provide examples of this.

Communication continues to cause difficulties. Teachers and lecturers should emphasise accurate use of notation, terminology, brackets and symbols. Candidates should practise the use of correct summation notation. Many candidates omitted linking words and phrases, especially where proof or justification was required.

Basic algebraic manipulation was a source of difficulty for a large number of candidates. For example, in question 18 (a) (i), it was common for candidates to fail to simplify the expression for the modulus, or to produce an incorrect simplification.

Grade boundary and statistical information:

Statistical information: update on courses

Number of resulted entries in 2018	3683
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Number of resulted entries in 2019	3706
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Statistical information: performance of candidates

Distribution of course awards including grade boundaries

Distribution of course awards	Percentage	Cumulative %	Number of candidates	Lowest mark
Maximum mark				
A	37.2%	37.2%	1379	64
B	20.8%	58.0%	772	53
C	17.4%	75.4%	644	42
D	7.3%	82.8%	272	36
No award	17.2%	-	639	-

General commentary on grade boundaries

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.

SQA aims to set examinations and create marking instructions that allow:

- ◆ a competent candidate to score a minimum of 50% of the available marks (the notional C boundary)
- ◆ 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.

Therefore, SQA holds a grade boundary meeting every year for each subject at each level to bring together all the information available (statistical and judgemental). The principal assessor and SQA qualifications manager meet with the relevant SQA head of service and statistician to discuss the evidence and make decisions. Members of the SQA management team chair these meetings. SQA can adjust the grade boundaries as a result of the meetings. This allows the pass rate to be unaffected in circumstances where there is evidence that the question paper has been more, or less, challenging than usual.

- ◆ The grade boundaries can be adjusted downwards if there is evidence that the question paper is more challenging than usual.
- ◆ The grade boundaries can be adjusted upwards if there is evidence that the exam is less challenging than usual.
- ◆ Where standards are comparable to previous years, similar grade boundaries are maintained.

Grade boundaries from question papers in the same subject at the same level tend to be marginally different year to year. This is because the particular questions, and the mix of questions, are different. This is also the case for question papers set by centres. If SQA alters a boundary, this does not mean that centres should necessarily alter their boundary in the question papers that they set themselves.