



## Course Report 2018

Subject	Mathematics
Level	Advanced Higher

This report provides information on the performance of candidates. 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**

## **Summary of the course assessment**

### **Component 1: question paper**

The 2018 question paper consisted of 17 short-answer and extended-response questions. It was similar in structure to the specimen paper and to the previous year's paper, although the final four questions were longer. Some of the longer questions were subdivided to enhance accessibility.

The question paper largely performed as expected. Feedback from the marking team and practitioners suggested that the paper was very fair in terms of coverage, level of demand and accessibility for candidates.

The level of demand was a little lower than in the previous year. Grade boundaries were adjusted accordingly.

## Section 2: comments on candidate performance

### Areas in which candidates performed well

#### Component 1: question paper

Question 1(b)	Quotient rule
Question 2	Partial fractions
Question 5	Euclidean algorithm
Question 8	Integration by substitution
Question 13(b)	Related rates of change — improved over 2016
Question 14	Sequences and series
Question 17	Maclaurin Series — candidates managed the basics well, approaching the more complex functions with confidence and making good use of the formula sheet.

### Areas which candidates found demanding

#### Component 1: question paper

Question 3(a)	<b>General term in a binomial expansion</b> Candidates looked to the formula sheet for help but many showed lack of understanding by leaving in the summation sign rather than isolating a single general term. Many candidates erroneously produced a full expansion.
Question 9	<b>Direct proof</b> In part (a), a number of candidates multiplied when asked for a sum, and many were unable to give the general form of consecutive integers. In part (b), the majority of candidates simply repeated the logic of the earlier part and did not appear to realise that they had to begin with a general odd number.

- Question 10      **Locus in the complex plane**  
Most candidates adopted an algebraic approach. Many of these candidates found it difficult to obtain the correct expression for the modulus of the second complex number or to equate it to the modulus of the first. Very few candidates adopted a geometric approach. Many seemed to expect a circle rather than a straight line.
- Question 11      **Transformation matrices**  
The majority of candidates were unable to produce a correct reflection matrix in part (b). Most multiplied their two matrices in the wrong order in part (c). In part (d), very few candidates managed to compare their resultant matrix with a general rotation matrix or to produce another valid argument.
- Question 12      **Proof by induction**  
Many candidates omitted important elements of the logic, including a correct statement of the inductive hypothesis. In a number of cases, candidates wrote down what they were attempting to prove instead of attempting the inductive step. Most candidates found the algebraic manipulation challenging.
- Question 15(b)      **Differential equation**  
Many candidates had a general idea of the routine to follow and produced the correct integrating factor, but lacked clarity and rigour when applying it. A number of candidates either did not include the constant of integration or did not deal with it appropriately.
- Question 16(b)      **Equation of a line of intersection of planes**  
Even after a successful attempt at part (a), very few candidates were able to produce a valid strategy for forming the equation of the line of intersection.
- Question 16(d)      **Geometrical relationship between two planes**  
Having recognised that the planes were parallel, many candidates were unable to give a valid justification. Commonly, candidates confused a direction vector with a normal vector or the symbol for a plane with the symbol for a vector. A large number of candidates incorrectly described one plane as a multiple of another.

## **Section 3: advice for the preparation of future candidates**

### **Component 1: question paper**

Candidates were well prepared for the question paper and it was clear that they had been very well supported in centres. They had made good use of published resources, including Understanding Standards material. Some candidates produced excellent and insightful answers for the more challenging questions, indicating high quality learning and teaching.

There was evidence that many techniques and routines had been thoroughly revised to ensure candidates' familiarity and understanding. However, some candidates had difficulty with the form of numbers (for example odd or consecutive) and logical structure. Candidates would benefit from clear feedback from teachers and lecturers in this area.

Teachers and lecturers should make candidates aware that in questions where they are asked to show a certain result is true, their justification must be clear, detailed and demonstrate understanding.

Communication continues to be a major issue for candidates. Teachers and lecturers should emphasise the accurate use of notation, terminology, brackets and symbols. Candidates must be accurate, explicit and consistent when using variables other than those that have been defined in the question. (Question 13(b) provided examples of this.)

Some of the course content, for example methods of differentiation, is naturally revisited in other parts of the course. Teachers and lecturers should give careful consideration to the parts of the course that are not reinforced in the same way, such as complex numbers, vectors and matrices.

## Grade boundary and statistical information:

### Statistical information: update on courses

Number of resulted entries in 2017	3586
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Number of resulted entries in 2018	3683
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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	37.5%	37.5%	1380	75
B	21.6%	59.1%	795	64
C	15.6%	74.7%	576	54
D	6.9%	81.6%	255	49
No award	18.4%	-	677	-

## **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 which 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.

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 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.

Grade boundaries from exam 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 exams set by centres. If SQA alters a boundary, this does not mean that centres should necessarily alter their boundary in the corresponding practice exam paper.