



## External Assessment Report 2012

Subject(s)	<b>Mathematics</b>
Level(s)	<b>Intermediate 2</b>

The statistics used in this report are pre-appeal.

This report provides information on the performance of candidates which it is hoped will be useful to teachers/lecturers in their preparation of candidates for future examinations. 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 question papers and marking instructions for the examination.

# Comments on candidate performance

## General comments

The vast majority of candidates were able to tackle all questions.

Feedback from Markers suggested that, although the paper was appropriate for the level, performance in Paper 1 was disappointing, especially from the Applications candidates.

Around 20% of those presented sat the Applications papers. These candidates did not perform as well as the candidates sitting the 1, 2, 3 options. The difference in performance between the two groups of candidates was more marked this year than in previous years.

## Areas in which candidates performed well

### Paper 1

Question 1: *Round to significant figures*. This was well done by the 1, 2, 3 candidates.

Question 2(a) & (c): *Cumulative frequency column and boxplot*. The majority of candidates gained these 3 marks — sometimes the marks for boxplot were ‘follow-through’ marks after incorrect quartiles.

### Paper 2

Question 1: *Arc of a circle*. Candidates scored reasonably well on this, although a significant number of them used the given circumference to work back to calculate the radius/diameter and then proceed correctly to work out the length of the arc.

Question 2: *Multiply algebraic expressions involving brackets*. Although categorised as A/B content, this was successfully completed by many candidates.

Question 4 (Apps): *Flowchart*. Well done. Lost marks tended to be where candidates had calculated in pence but wrote answer as pounds.

Question 5(a): *Mean and standard deviation*. Well done.

Question 5(b): *Interpret statistics*. This question performed better than it usually does, probably due to the way the question was presented — candidates had simply to choose the correct option(s) from the selection given, rather than explain in their own words.

Question 6: *Simultaneous equations*. Again well done, with most candidates coping well with the communication demands in part (c).

Question 8 (1, 2, 3): *Trigonometric equation*. Candidates tackled this well, with fewer than usual working in radians.

Question 8 (Apps): *Loan*. Candidates scored highly in this question.

Question 9 (Apps): *Formulae*. It was heartening to notice that candidates took time and care to work out each stage, thereby increasing the chance of gaining marks.

Question 10: *Chord in a circle*. Well done by 1, 2, 3 candidates.

## Areas which candidates found demanding

### Paper 1

Question 2(b): *Quartiles from cumulative frequency table*. Application candidates in particular performed poorly in this question. Many incorrectly used the figures from the Marks or Frequency columns to obtain the 'quartiles'.

Question 3(b): *Straight line*. Some candidates seemed to realise that the  $y$ -coordinate should be 8, but had no idea how to use this information to obtain the corresponding  $x$ -coordinate, and simply guessed. (4,8) was a common wrong answer.

Question 5(a): *Calculate the mean*. This question properly belongs in Intermediate 1 but was used here as a lead-in for 1 mark. However, despite the fact that the question was below the level of competence for Intermediate 2 candidates, a high number of candidates could not carry out the calculations correctly. Many understood the strategy but their arithmetic skills let them down.

Question 5(b): *Comparison of statistics*. Usually candidates are asked to compare similar statistics, ie to compare two means or two standard deviations, etc. Here they were asked to compare mean and median for particular data and many had no idea what was expected of them.

Question 6 (1, 2, 3): *Quadratic graph*. Part (c) was particularly poorly done — often because the answer was not written in the correct form (ie as an equation). Although the scores in part b were better, a similar problem arose — candidates were asked for coordinates but often did not present their answer(s) in coordinate form.

Question 6 (Apps): *Ogive*. Most candidates could not use the curve to work out  $Q_1$  and  $Q_3$ . However if they did work these out incorrectly, they could still pick up the final mark.

Question 7: *Given area of a triangle, calculate a side*. Some candidates used the sine rule, despite dealing with area. Those who substituted correctly into the Area formula often lost the final mark because of poor arithmetic skills.

Question 8(a): *Factorisation*. Few candidates could correctly factorise this expression, presumably because there were no constants in it.

Question 8(b): *Using factorisation to evaluate*. Out of those candidates who factorised part a correctly, only a few substituted to reach  $(94 + 6)(94 + 6)$ , and most of these could not go on to complete the calculation. Most candidates tried to evaluate the expression from the version given in part b, rather than the factorised version. It was very disappointing to note that virtually no-one among these could actually complete this calculation correctly.

Question 9 (Apps): *Spreadsheets*. It is significant here that candidates scored much higher in part c than in parts a and b. This would suggest that they understand what is happening in the spreadsheet but are not sufficiently familiar with the demands of writing spreadsheet

formulae. Common errors in the first two parts are — omitting the = sign at the beginning of each formula; not using \* instead of x; not using / instead of ÷. It is also worth noting that the word SUM appeared incorrectly in very many formulae.

Question 10 (1, 2, 3): *Surds*. Presented problems for candidates. However, some did manage to work it out arriving at an answer of  $\sqrt{4}$ , unable to complete from here.

Question 10 (Apps): *Given total pay, calculate the number of hours overtime*: given that this was a non-routine A/B question, it was not altogether surprising that performance was not strong here.

## **Paper 2**

Question 7 (Apps): *Networks*. poorly done, suggesting that more work needs to be done on the actual terminology of networks.

Question 9 (1, 2, 3): *Change the subject of the formula*. In recent years, candidates have performed well on this topic. However, it seemed this year that candidates were 'jumping' directly from the equation in the question to an expression for  $D^2$ , usually  $D^2 = EI$ . They could then pick up the final mark for arriving at a 'consistent'  $D$ .

Question 11 (1, 2, 3): *Indices*. Candidates had a lot of difficulty with this question, even before expressing their answer with positive indices.

Question 11 (Apps): *Mean using class intervals*. The majority of candidates could calculate the mid-point of the class intervals. After that, they were often unclear how to continue.

Question 12: *Trigonometry*. This 5 mark question required that candidates perform calculations from two distinct triangles. However, since many candidates did not draw a diagram and made errors in calculating the sizes of the angles, it was very difficult for Markers to determine which triangle(s) the candidate was using. Candidates may well have gained more marks had they drawn a diagram and marked on it the sizes they were using.

Question 13: *Percentages*. The percentage question usually appears near the beginning of the question paper. This year it was near the end because the question was more difficult — a non-routine A/B question. Candidates did not perform well in it, with many gaining only 1 mark out of 4.

Question 14 (1, 2, 3): *Trigonometric identities*. As usual this question proved difficult for candidates.

# Advice to centres for preparation of future candidates

## General

Hopefully, the above points will help centres in preparing candidates for the external examination in Intermediate 2 Mathematics. In summary:

- ◆ In the non-calculator Paper 1, there will usually be one or more questions where candidates have to demonstrate a facility for calculation (without a calculator) within a question testing Course content, eg in this year's Paper 1, Q5(a), Q7, Q8(b), candidate performance in number skills was very disappointing, and cost many candidates valuable marks. Centres should continue to encourage/enable candidates to practise their number skills, especially within questions testing Course content.
- ◆ Centres deserve credit for the way in which candidates are currently prepared for the external examination. Candidates are well-schooled in dealing with standard questions (eg breaking brackets, simultaneous equations, standard deviation, trigonometric equations, etc) and this is reflected in their scores for these questions. However, when a question is presented in a different way from usual, candidates seem to find it difficult to adapt to this, eg Paper 1 Q3 — an apparently straight-forward question on the straight line that candidates found very difficult to deal with. Centres should continue to present plenty of opportunities for candidates to practise non-standard questions.
- ◆ Communication is very important in presenting solutions to questions. Candidates should be aware of the importance of diagrams in conveying information and enabling Markers to understand candidates' strategy. In this year's paper, this was especially relevant for Paper 1 Q4 and Paper 2 Q12.
- ◆ Detailed Marking Instructions for Intermediate 2 are available on the SQA website. Teachers may find it useful to direct candidates to these in an attempt to help them realise the importance of presenting certain evidence/ working in their responses and so maximise the marks they can be awarded.
- ◆ At this level, it is expected that candidates can be mathematically correct in the way they present answers, eg when asked for an equation of the axis of symmetry, candidates should ensure that the response is an equation; coordinates should be written correctly; spreadsheet formulae should be written precisely. Centres should continue to emphasise this to candidates and ensure this is reflected in exercises / assessments within the centre.

## Statistical information: update on Courses

### Intermediate 2

Number of resulted entries in 2011	22,406
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Number of resulted entries in 2012	23,536
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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 80				
A	29.3%	29.3%	6,894	52
B	19.3%	48.6%	4,547	44
C	19.1%	67.7%	4,484	36
D	7.8%	75.4%	1,826	32
No award	24.6%	100.0%	5,785	-

## **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, therefore, SQA 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 Head of Service 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.