

An investigation into the increase in C1 candidate numbers in January 2008

1. Background

The origins of this paper lie in an awarding committee meeting for the January 2008 AS and A2 units. The data provided to the committee showed that the numbers for C1, the first AS unit in mathematics, had increased substantially over those for January 2007. A subsequent check with the other awarding bodies showed the same to be true for all the specifications. Clearly this situation merited further investigation and so MEI carried out an online survey in April/May 2008. The following text formed the introduction.

In January 2008 the candidate numbers for all four AS/A Level Mathematics specifications (in England) showed an increase of between 10% and 15%, compared to January 2007. If this represents a genuine increase in the number of students opting for mathematics post-16, it is incredibly good news.

However, before letting ourselves get too excited about this, we are considering other possible explanations and would value your help in doing so. To do this, please complete the short on-line questionnaire below.

We have identified 4 possible causes for increases in C1 numbers:

1. Schools changing specifications: Since all the specifications report the same effect this cannot be the explanation.
2. Increase in re-sits: This is unlikely to be the case in January because it would require a massive proportional increase in Year 13 candidates re-sitting; there is no apparent reason (e.g. a really disastrous C1 the previous June) why this should have happened for all specifications.
3. Change in entry patterns: It is possible that a number of schools and colleges have abandoned a previous policy of no January entries, or have just decided to enter C1 candidates earlier than last year. Another possibility is that more schools have decided to enter students for AS units in Year 11, including C1 in January.
4. Genuine increase in uptake: If no other explanations hold, then it would seem that this must be the case.

This paper gives an analysis and discussion of the responses to the survey.

2. Methodology

In order to consider if there had been an increase in C1 student numbers and why, an online questionnaire was used. There were four questions, which enabled student numbers for the January 2007 and January 2008 sittings to be compared, as well as reasons for any changes. The actual survey can be seen in the appendix. It was advertised by a number of bodies as well as MEI. Responses from 171 centres were used in the final analysis. This represents about 6% of the schools/colleges offering some kind of A level Mathematics provision.

3. Survey Analysis

Two types of analysis were applied to the survey, quantitative and qualitative. The first of these enables the trends to be seen. Whilst the second also does this to some extent, it also allows for more in-depth analysis of the reasons behind the changes; these are of particular interest for this paper.

3.1 Quantitative Analysis

The total number of C1 candidates in the responding centres was 6729 for January 2007 and 8212 for January 2008. This represents an increase of 22%. Such a headline figure is potentially very good news; the main purpose of this study was to check that at least part of the increase was due to increased student numbers rather than other causes.

The analysis in this paper is based on a self-selecting sample and so any conclusions should be treated with suitable caution. The responses may not be entirely representative of the overall population of all schools/colleges. Indeed, the total C1 figure for 2007, 6729, represents 8.7% of all the 77 387 candidates who took AS Mathematics in the UK that year; this is greater than the 6% of providers, suggesting that larger centres were over-represented.

The 22% increase in student numbers reported in the sample is larger than the 10-15% increase in candidate numbers reported by the awarding bodies; there are a number of possible explanations for this disparity but the available data do not allow a consideration of them.

Not all the centres who replied to the survey reported a rise in student numbers. Although 60% did, 19% showed no difference and 21% showed a decrease in C1 numbers in January 2008 compared to January 2007.

The mean increase in the group of centres who reported an increase, 17 students, was much larger than the mean decrease of 7 students in centres where there was a decrease.

The increase in C1 candidate numbers reported by the awarding bodies for January 2008 is fact. Question 2 of the survey asked for explanations. 101 respondents said there had been an increase and most, but not quite all, of them gave reasons. Seven explanations

were given and the table on page 3 gives estimates, based on the data, of their relative importance in terms of student numbers.

Explanation	Estimated % of students
Genuine increase in student numbers	64
January entries now allowed	27
Increase in Further Mathematics entries	6
Year 11 entries	2
Re-sits	1
Change in cohort size	-
A strong cohort	-

The table shows that, when an increase was seen, by far the most common reason for it was an increase in the uptake of AS Mathematics in Year 12. The other major explanation was that some centres had relaxed a policy restricting January entries. The other explanations did not account for many candidates between them.

While these figures give an overall picture, the narrative feedback given in the free response section of the survey allow a deeper understanding of the situation to be obtained.

3.2 Qualitative Analysis

The design of the survey provided participants with the opportunity to explain what was happening in their centres, be it an increase in C1 numbers or a decrease. This worked well with almost two-thirds of the respondents filling in the 'Any other comments' box. One-fifth of these comments were from those who saw a decrease, one-fifth from those who saw no change and three-fifths from those who saw an increase.

Many interesting comments were received and several themes emerged; these are considered in the rest of this report.

4. Discussion about candidate numbers

The responses to the survey provide evidence to confirm the observed increase in the number of C1 examination candidates. Explanations for this were given in the comments the respondents entered. These are now discussed.

4.1 Genuine increase in student numbers

Of those centres that reported an increase, 77% attributed it to a genuine increase in student numbers.

We were up again massively. Next year we expect 53 to start C1. (From 26 –2007, 32 – 2008)

Due to the demand, we have three groups of AS maths this year instead of 2, so there are 55 AS students this year compared with 40 last year. However, only half our students come straight from a UK school, the others are older or have studied in another country. The students straight from school seem to be stronger candidates this year. We have no idea why this is and will be very interested in the results of your survey.

There has been a significant increase in Lower 6 uptake of Maths over the last two years. We now have two extra sets compared to 2 years ago.

At our sixth form college this time last year we had 280 applicants for Maths and 76 for Further Maths. This year we have 400 for Maths and 87 for further Maths.

4.2 January entries now allowed

The other numerically substantial explanation was that some centres that had previously disallowed January entries had now changed that policy.

All year 12 students were entered for C1 whereas previously it was just the further mathematics groups

In 2007 only one of the teaching groups was entered for Core 1 in January, the group which was judged to be the stronger mathematically. Because they did well, and because it serves to give a good early indication of progress, the Head was persuaded to allow us to enter all Yr 12 Maths students this year. As the results were, again, quite good overall, this policy will continue next year.

Yr12 entered for C1 after 1 term for first time, to avoid back to back exams in summer.

I usually enter for S1 in Jan but swapped to C1 as a trial this time to avoid the students having to sit 2 papers in one session in May as the results were poor last summer.

Several respondents (including the two quoted above) said that they had changed policy so that students did not have to sit back to back C1/C2 papers in the June session. This could merit further investigation to see whether there are further factors in play, e.g. if it is the weaker students who cannot cope with back to back papers, and if so whether they cope any better by sitting a January examination.

4.3 Increase in Further Mathematics entries

One of the more widespread comments was that there had been an increase in Further Mathematics numbers. Several centres commented that the increase in C1 entries were Further Mathematics students who, unlike the A level Mathematics students, took the C1 examination in January rather than summer. This explanation was unexpected but perhaps it should have been anticipated in the climate of increasing numbers of students taking Further Mathematics.

Single maths students do S1 in Jan and C1 in the summer. Only the Further Maths students take C1 in Jan. Jan 07 = 8, Jan 08 = 12. Note uptake for single maths is up. We have 50 students 2008, 41 (2007).

There were also comments relating to an increase in student numbers even if there was a 'no January examinations' entry policy:

We do not allow entries in January. We are experiencing a large increase in numbers for AS and A2 Mathematics and Further Mathematics, so much so we are appointing an extra full time teacher in Mathematics this year.

4.4 Year 11 entries

In a few cases responses were received which stated that some Year 11 students had sat the C1 paper, although the numbers were relatively small.

We are beginning to use the AS maths units for top sets in fifth form. This is now possible due to the new approach in the league table calculations which allows GCSEs to be done early and counted at the right time. Also the emphasis on Gifted and Talented development has led to fifth form doing AS units if very bright...

Currently our top set Y11 students take C1 in Jan; we are revising this policy though.

Since 2007 we have entered a fast track group for AS in year 11.

4.5 Re-sits

Some centres referred to the January session as being an opportunity for students to re-sit C1. However, as highlighted in the table in section 3.1, this did not contribute much to the overall increase.

Currently we only use C1 as a re-sit opportunity for year 13 students, no plans to change this. Numbers in Maths are buoyant, up circa 10% this year, good uptake from internals (60 from 120) and external applicants to Year 12 (50 from 80). We are finding that science is also doing well with us.

Our policy is never to use the January session of year 12 for C1. All our students take C1 and C2 in the summer of year 12. The very small numbers of year 13's who re-sit are variable of course, and this is no indication of the size of the cohort. In fact the uptake of AS level maths has increased significantly at this school over recent years.

4.6 Change in cohort size

Some centres stated that there has been an increase in total student numbers entering their sixth form and Mathematics numbers have increased accordingly.

There was also a large increase in the number of students attending the college. (C1 numbers increased from 80 to 100).

The most likely explanation is that these are students who have chosen to go to one centre rather than another. Indeed some of those where numbers had fallen ascribed this to falling overall student intake.

An alternative explanation, and there is no evidence either to support or to reject it, is that the extra students represent an increase in post-16 uptake of education. In the past an increase in overall numbers has not lead to a proportionate increase in mathematics students. If that is changing, it is indeed welcome.

4.7 A strong cohort

Some respondents reported that this year there had been a strong cohort going through from Year 11 into Year 12.

Our current year 12 cohort (155 students) is the largest we have ever had but they were a very strong GCSE year. Estimates for numbers of students taking up AS maths next year are similarly high.

Our year 12's this year are particularly strong at mathematics (and last year's a little weaker than usual) which is the major reason for the increase in C1.

It would be reasonable to imagine that this is balanced by weak, but unreported, cohorts in other schools/colleges.

5. Discussion of underlying causes

In the previous section, seven explanations of the increases were described. In this section, there is a description of the underlying causes reported by respondents.

5.1 The 2004 specifications

Some responses commented favourably on the effect of the 2004 specifications, which are clearly working well.

The numbers opting to study maths has shown a steady increase since the introduction of the new scheme in 2004. As have the numbers opting to study Further Maths at AS, more recently we have students continuing on to A2 Further Maths.

General feeling it is more accessible ...

For us this trend of growth started in 06. Numbers of new C1 attempts go 05 - 118, 06-165, 07-178, 08-202.

5.2 The profile of STEM subjects

Several comments indicated that mathematics and the sciences were receiving a better profile in schools/colleges, causing an increase in interest in these subjects.

There seems to be a dramatic shift towards students electing to take the sciences and maths. The college cohorts for these two years have remained pretty much the same. We are now desperately seeking science and maths teachers ... (Uptake increased from 390 to 510)

I think AS maths has become more popular. Students know that it has more credibility than other less demanding subjects.

Both Sciences and Maths seem to be surging in numbers at the moment - partly bigger sixth form numbers for us but also modular GCSE proving v popular and encouraging sixth form students.

Projected numbers for 2009 are about 40 (from 18). We just have more pupils interested in maths.

In addition for some schools/colleges there had been an increase in performance in the subject by students; once younger students had realised this, their interest was raised further.

We are fortunate enough, a number of staff willing and able to teach Mathematics at A-Level and students have also researched and compared the grades achieved

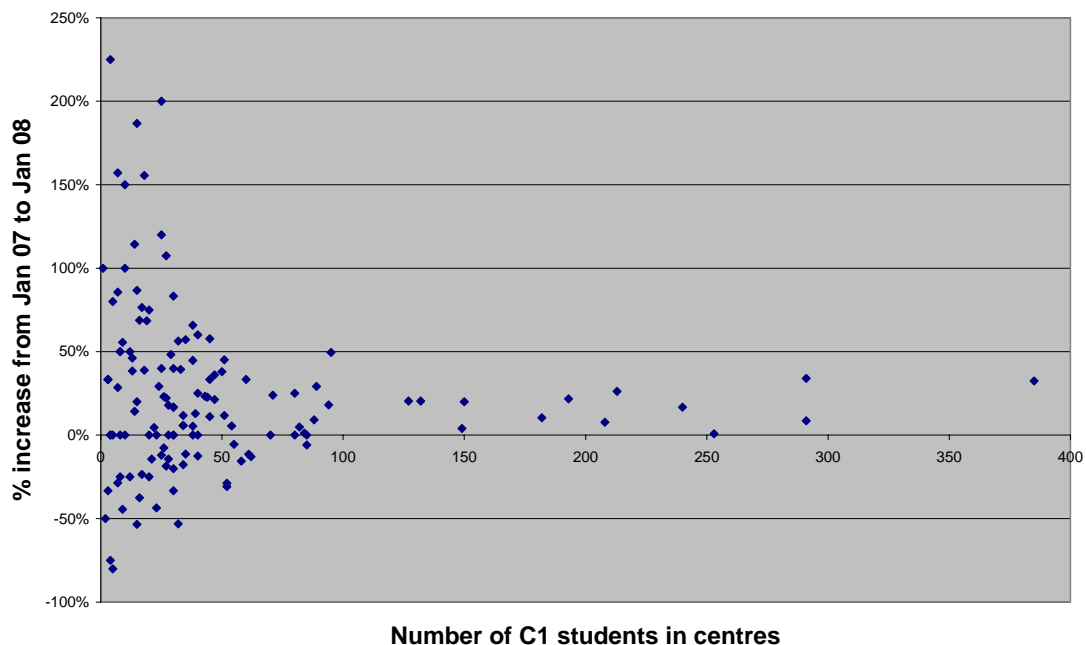
by past students across all subjects and have selected those courses they feel they can best be successful at. We find the resources available from the web site extremely useful and the opportunity to send students on Revision Days.

5.3 Centre size

The size of centres raises interesting issues.

In the 25% of centres that showed the largest gain in actual student numbers, the average number of C1 students was 101 in January 2007 and 142 in January 2008; median values were 45 and 74 students respectively. This clearly indicates that in general those with large numbers were being successful at recruiting more students.

In the scatter plot below, centres' percentage changes in C1 student numbers are plotted against their numbers for 2007.



Notes

1. The plot does not show the 11 centres that went from having no C1 students to having some students (these were 2, 2, 3, 5, 10, 13, 20, 20, 21, 34, 55 students respectively). 9 of these had a change in entry policy.
2. The plot does not contain those with percentage increases larger than 250% as this would skew the scale. The centres where this occurred all had very small numbers in 2007 (e.g. 1 in 2007 and 17 in 2008).
3. The plot is for student rather than candidate numbers. For some centres this involved reasonable interpretation of the available data but for others this was not possible and so they are not included.

The plot shows that there was considerable variability in the percentage increase/decrease in C1 student numbers in the smaller centres. However, as already reported, there were clearly more centres with an increase than a decrease.

The plot also supports the idea that much of the increase in student numbers occurred in the larger centres. Although such centres did not necessarily produce the largest percentage increases, many more students were involved; for example a 34% increase in student numbers from 291 to 390 involves many more students than a 300% increase from 2 students to 8.

The 10 largest increases in actual numbers all occurred in colleges. A possible explanation of this is that they adopted a more inclusive acceptance policy of students into mathematics than some other centres. This finding, which was unexpected, definitely merits further investigation.

5.4 Changes external to mathematics

It was also apparent, that although the changes to Mathematics in 2004 had been successful, two different changes, external to mathematics, could have unexpected effects.

- The change of some other A level subjects from six to four units.
- The formation of consortia. These are a response to the impending introduction of diplomas; (a single centre may be unable to offer all diplomas and so consortia are being formed so that a student can access all diploma subjects).

It is too early to say what effect, if any, these changes will have but it would be prudent to monitor the situation.

We, as a school, are looking at not having a yr 12 exam session in Jan as most subjects are now four units and won't have candidates prepared.

Jan 2009 is likely to see a reduced entry for C1 from us. This is due to other subjects changing to the new 2-module specifications at AS, whilst maths retains 3, there is unlikely to be a January sitting in the same way. This would not mean less interest in AS/A2 Maths; simply that the assessment structure may be used differently. Personally I value the January sitting, and will endeavour to continue using it as strongly as we do currently: Lower 6 AS candidates, Lower 6 Further Maths candidates, Upper 6 re-sits... Much to decide! But great overall that numbers are on the increase.

We had a lower total intake into year 12 which may explain the drop in numbers. We have a lot of students who decide to go elsewhere for the 6th form for many factors - being girls only, not liking the consortium arrangements, not being able to get the programme of study they require. I am expecting a marked increase for January 2009.

6. In Conclusion

The principal outcome of the survey is that there is a genuine increase in the number of students compared to last year. The consequence of this positive finding should not be underestimated. More students continuing to study mathematics is crucial to many aspects of our national life. It also provides a welcome boost to the STEM agenda.

It is really important that the reasons for these increases are properly understood so that appropriate action can be taken to support and promote them.

While this survey was set up to answer the limited question as to whether C1 student numbers are rising, it has also produced other information which means that it could be used as a pilot study for other important research that suitable institutions may wish to pursue.

7. Acknowledgements

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Appendix The survey questions

C1 numbers survey - Increase in C1 candidate numbers

Please note that we are collecting information from centres preparing students for ALL specifications, not just MEI.

Questionnaire

1. How many C1 candidates did your school/college have in the last two January sittings?

January 2007

January 2008

Please tick this box if the numbers are approximate:

If there were more candidates in January 2008, please answer questions 2; otherwise go straight to question 3.

2. Which of the following statements explains the increase?

You may choose more than one answer. Please give actual numbers if you can easily do so.

A There was an increase in uptake of AS mathematics in Year 12.

Yes, please give the increase in the number of students:

No

B There was an increase in the number of re-sits.

Yes, please give the increase in the number of students re-sitting:

No

C There was a change in your school's or college's entry policy.

Yes

No

If relevant, please use the space below to explain the nature of the change in entry policy.

3. If there are any other comments you would like to make, please write them in the box below.

4. This information will not be used other than to allow us to ensure that responses are genuine. Individual schools/colleges and respondents will not be identified in any analyses of the results.

School/College name:

Examination centre number