

**Foundations of Advanced Mathematics (MEI)**

Free Standing Mathematics Qualification **6989**

**OCR Report and Mark scheme**

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**June 2013**

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

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### Foundations of Advanced Mathematics (MEI) FSMQ (6989)

#### OCR REPORT AND MARKSCHEME

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# 6989 Foundations of Advanced Mathematics

## Report to Centres

There were just fewer than 1600 entries for this series, a little lower than in previous years. The mean mark was 26. The minimum mark, scored by one candidate, was 6 and six candidates scored the maximum mark of 40.

In most questions, at least one candidate offered no answer and in some cases, there were quite a number of questions which were not answered. Questions which received no response were scattered throughout the question paper so this did not provide any evidence that candidates found the question paper too long. Failing to provide a response continues to surprise given that there is no penalty for choosing an incorrect response.

In all questions each of the distracting responses was selected by at least one candidate.

In 6 questions, the correct response was answered by fewer than 50% of candidates.

### Q8 Arithmetic

This required a reasonably high level of skill in using the calculator and fewer than 30% chose the correct response with 30% choosing response D and approximately 20% each choosing responses A and B.

### Q11 points on a cubic

This question required candidates simply to substitute a given value of  $x$  and check whether the resulting value of  $y$  agreed. For response A, the value of  $x$  was negative so it was likely that candidates got confused with calculating these values and failing to achieve the correct value for  $y$ .

### Q12 Algebraic powers

Response C was the next popular choice; it may be that candidates thought that  $x^3 \times x^{-3} = 0$  resulting in this response being the false statement. A significant number of candidates chose this response.

### Q 20 Probability, throwing two dice

A number of candidates chose response A; presumably a score of 1 was a possibility meaning that there would be 12 possible scores not 11. Response C was rather more difficult to work out to test its accuracy. A number chose this response; maybe this was because it did not look right rather than working it out incorrectly (or even knowing the symmetry of the distribution!).

### Q 25 cumulative errors

Response C was more popular than the correct response, D. The statement “may be possible” indicated that it was necessary to select possible thicknesses of books and the length of the shelf to see if they could be fitted. If particular lengths and thicknesses were chosen, then it was possible that it could have been the wrong combination and did not fit.

**Q29 Algebra - Sum of algebraic fractions**

This is a standard question which is asked most years and the response has usually been rather better than this year. The correct response (D) was chosen by only 40% with the other three responses receiving very similar numbers.

**Q32 Graphs - graphical properties of the straight line**

The number of correct responses only just fell below the 50% level with candidates choosing the other responses with different proportions. It ought to be clear that substituting (0, 0) into the equation did not fit, and even that any function  $y = f(x)$  with a constant term will not pass through the origin. It may indicate, once again, that candidates who believe that another response is the correct one will not look at the remaining responses – the correct response to this question was D.

**Q33 Graphs – properties of a cubic curve**

Once again, it was response D that was the correct response and approximately equal numbers chose one of the other responses.

**Q35 Vectors**

Both responses B and D were more popular than C indicating a general lack of understanding of vectors.

As in previous sessions below is a summary of questions and topics with the approximate percentage of candidates giving the correct responses.

| Percentage obtaining the correct response | Question | Topic  |
|---|----------|--|
| 91 – 100                                  | 2        | Arithmetic - operations                                    |
|   | 7        | Arithmetic – sensible units                                |
| 81 – 90                                   | 3        | Arithmetic - powers  |
|   | 5        | Arithmetic - ratios, proportion and percentages            |
|   | 6        | Arithmetic - standard form                                 |
|   | 15       | Algebra - solution of simultaneous equations algebraically |
|   | 21       | Algebra - changing the subject                             |
|   | 31       | Statistics - choosing a sample                             |
|   | 36       | Vectors  |
|   | 38       | Statistics - histogram                                     |
| 71 – 80                                   | 9        | Arithmetic - rounding of numbers                           |
|   | 14       | Algebra - solution of linear equations                     |
|   | 16       | Algebra - solution of inequality                           |
|   | 18       | Algebra - formation of formula from description in words   |
|   | 23       | Trigonometry - graphs of trigonometrical functions         |
|   | 27       | Algebra - roots of quadratic equation                      |

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|         |   |  |
|---------|---|--|
| 61 – 70 | 1   | Arithmetic - terminology                             |
|         | 4   | Arithmetic - fractions                               |
|         | 17  | Algebra - expansion and factorisation of expressions |
|         | 19  | Arithmetic - scale drawing                           |
|         | 22  | Probability - tree diagram                           |
|         | 24  | Arithmetic - approximations                          |
|         | 37  | Arithmetic - percentage increase                     |
| 39      | Graphs - solution of simultaneous equations graphically |  |
| 51 – 60 | 10  | Arithmetic - sequences                               |
|         | 13  | Algebra - factorisation of quadratic functions       |
|         | 26  | Trigonometry - 2 right angled triangles              |
|         | 28  | Trigonometry - Sine rule                             |
|         | 30  | Trigonometry - 3D problem                            |
|         | 34  | Graphs - speed/time graph                            |
|         | 40  | Statistics - cumulative frequency graph              |
| 41 – 50 | 11  | Graphs - points on a curve                           |
|         | 12  | Algebraic powers                                     |
|         | 20  | Probability  |
|         | 32  | Graphs - graphical properties of the straight line   |
|         | 33  | Graphs - properties of a cubic curve                 |
| 31 – 40 | 29  | Algebra - sum of algebraic fractions                 |
| 21 – 30 | 8   | Arithmetic   |
|         | 25  | Arithmetic - cumulative errors                       |
|         | 35  | Vectors  |

**Mark scheme**

| Question | Answer | Question | Answer |
|----------|--------|----------|--------|
| 1        | C      | 21       | A      |
| 2        | B      | 22       | D      |
| 3        | C      | 23       | A      |
| 4        | B      | 24       | A      |
| 5        | C      | 25       | D      |
| 6        | C      | 26       | C      |
| 7        | C      | 27       | D      |
| 8        | C      | 28       | B      |
| 9        | C      | 29       | D      |
| 10       | C      | 30       | A      |
| 11       | B      | 31       | B      |
| 12       | A      | 32       | D      |
| 13       | D      | 33       | D      |
| 14       | C      | 34       | D      |
| 15       | C      | 35       | C      |
| 16       | D      | 36       | D      |
| 17       | A      | 37       | B      |
| 18       | A      | 38       | C      |
| 19       | A      | 39       | A      |
| 20       | B      | 40       | B      |

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