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FSMQ

Foundations of Advanced Mathematics (MEI)

Free Standing Mathematics Qualification **6989**

Examiners' Reports

January 2011

6989/R/11J

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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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EXAMINERS' REPORTS

Foundations of Advanced Mathematics – 6989

There were just over 600 entries for this session; this represents a slight decrease in entries. The mean mark was 23.6. The lowest mark on this paper was 8. One candidate achieved full marks, 4 each scored 39, 38 and 36 with 11 scoring 36.

In this paper there were 26 questions in which at least one candidate offered no response; there were a number of questions where 3 or 4 candidates did not give a response. Given that there is no penalty for an incorrect response this is surprising.

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

In 10 questions the correct response was chosen by a minority of candidates and in 5 further questions an incorrect response was chosen by a majority of candidates; this is much higher than usual.

Q4 (Conversion of metric units)
A significant minority chose the conversion of cm per second to km per hour as being incorrect.

Q10 (powers in algebraic terms)

$\frac{1}{4x} = 4x^{-1}$ was deemed to be incorrect by only 33% while $\left(\frac{3x^2}{2}\right)^3 = \frac{27x^6}{8}$ was chosen to be incorrect by 38%.

Q12 (Coordinate geometry of the straight line)
Only 41% decided that response A was the incorrect one. The absolute value here is correct but the gradient is negative. Alternative responses were evenly spread.

Q18 (Arithmetic; approximations)
The response that 47 books can definitely be placed on the shelf is incorrect was chosen by 31% while 46% chose the response that 49 books might fit as incorrect.

Q22 (Trigonometrical ratios)
Only 36% thought that, for all values of θ, $0 \leq \sin\theta \leq 1$, while 41% thought that there were not exactly 2 values in $0 \leq \theta \leq 360$ for which $\tan\theta = 1$. (Whether they thought that there were fewer or more, of course, we do not know!)

Q25 (Solution of quadratic equation by formula)
34% rearranged the equation so that it was in the "standard" format, applied the formula and obtained the response A. 40%, however, applied the formula with the coefficients $a = 7$, $b = -3$ and $c = -12$.

Q26 (Construction of expression from words)
Only 46% decided that the correct thing to do was to divide by 100 to turn pence into pounds. 39% chose to multiply.

Q27 (Construction of equations of lines from graph)
Only 44% chose the correct response; the rest were equally spread.

Q28 (Vectors)
The majority of candidates accepted that the modulus of the vector was 13 rather than $\sqrt{13}$. Responses B and C were equally popular.

Q31 (3-D trigonometry)
Only 36% gave the response D. This may be because candidates who failed to work 3-D pythagoras or a trigonometrical ratio in a 3-D context correctly thought that they had already found an incorrect answer.

Q32 (Rearrangement of formulae)
Only a minority chose the correct response; the remaining choices were equally spread.

Q36 (Constant acceleration speed time graph)
Misunderstanding of the scales of the axes possibly led only 34% to say that the value given for the acceleration was wrong, while 43% incorrectly chose the distance as the incorrect answer.

Q37 (Algebraic sequences)
This question included all three of the sequences that are expected to be known by candidates. The three statements gave a correct example of each and all three were correct (response D, chosen by only 27%). 44% decided that only 2 of the statements were correct, though we do not know which one was thought to be wrong.

Q38 (Trigonometry; sine and cosine rules)
Just under half the candidates chose the correct response; other responses were equally spread.

Q40 (Algebra; graphical solution of cubic equation)
Only 38% were able to confirm that the gradient of the curve was negative at $x = -0.5$. The other responses were equally spread between B and C with a few choosing A.

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

Question Topic

91 – 100%	5	Arithmetic; conversion graph
	16	Arithmetic; appropriate units
81 – 90%	1	Arithmetic; order of operations
	11	Data handling; average and range of small sets of data
	30	Algebra; solution of simultaneous equations
71 - 80%	3	Arithmetic; ratios, fractions, percentages
	7	Data handling; mode, pie chart, simple probability
	13	Arithmetic; percentage increase and decrease
	15	Arithmetic; standard form
	17	Vectors
	24	Probability; independent events
	29	Probability; dependent events
	39	Algebra; following a list of instructions
61 - 70%	6	Arithmetic; approximations and rounding
	8	Algebra; substitution
	19	Algebraic manipulation
	20	Arithmetic; scale factors
	23	Algebra; solution of quadratic equations by factorisation
	33	Arithmetic; mensuration
	35	Handling data; cumulative frequency

51 - 60%	2	Arithmetic; factors, multiples
	9	Algebra; solution of linear equations
	14	Arithmetic; addition and subtraction of fractions
	21	Algebra; inequalities
	34	Algebra; Addition of algebraic fractions
41 - 50%	4	Arithmetic; Conversion of metric units
	12	Coordinate geometry of the straight line
	26	Algebra; construction of expression from words
	27	Coordinate geometry; equations of straight lines from graph
	32	Algebra; rearrangement of formulae
	38	Trigonometry; sine and cosine rules
31 - 40%	10	Algebra; powers
	18	Arithmetic; approximations
	22	Trigonometrical ratios
	25	Algebra; solution of quadratic equation by formula
	31	Trigonometry; 3 dimensions
	36	Algebra; constant acceleration speed time graph
	40	Algebra; graphical solution of cubic equation
21 - 30%	28	Vectors
	37	Algebra; sequences

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