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General Certificate of Education

Mathematics 6360

MFP4 Further Pure 4

Report on the Examination

2010 Examination – January series

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General

Compared to January 2009, there was an increase in entries of over 50% for this January's paper, which was good to see but which makes it difficult to compare the candidates' performances across the two papers in a particularly meaningful way.

Moreover, it is difficult to make general remarks as to how these candidates fared as a broad mixture of abilities was evident: almost a quarter of candidates failed to score more than 30 of the 75 marks available while, at the other end of the scale, over a quarter managed to score at least 60. This was symptomatic of the variability in the quality of the work seen — the impression gained during the marking period was that candidates were generally either very well prepared for the task and well in command of the module's material or just not in the least bit ready to take the paper at this time. In rather too many of the latter cases, it was very clear that the candidates were yet to even encounter several of the topics in the module.

Many candidates did not seem to have sufficient time to complete attempts at all seven questions, but these were primarily those candidates who appeared to be struggling anyway, irrespective of time. An additional factor, again providing evidence of a lack of exam-readiness, was an inability to pick up on the often-explicit demands of the questions. This frequently led to the production of lengthy portions of written work which scored no marks, either because the candidate had failed to use the method required in the question or because they went back and repeated work from scratch that effectively they had already done.

Question 1

This was a straightforward starter to the paper, yet one that still required a bit of thought; especially with parts (b) and (d), where, respectively, the minus sign and the extra factor of 3 were often overlooked.

Question 2

Apart from a small minority of candidates who worked with the position vectors of A, B etc rather than the vectors $\overrightarrow{AB}$, $\overrightarrow{AD}$ etc, this was usually found quite straightforward — at least up until part (c), when the significance of the word "deduce" was almost universally ignored. Its original intention was to spare candidates from lengthy amounts of working, and point them in the direction of the obvious method, reinforced by the inclusion of a diagram. Remarkably few candidates spotted that the required distance was simply part (b)'s answer divided by part (a)'s, which was a shame for those who went ahead with other methods, as they received no credit. That said, almost no-one who tried one of these other methods obtained the right answer anyway.

Question 3

The matrix multiplication was generally handled very well, apart from a small but noticeable number of candidates who insisted on attempting $\mathbf{BA}$ despite the question. The only other obstacle to a completely correct part (a) was found amongst those candidates who had the odd one or two incorrect elements, which they had failed to notice and correct due to a lack of a check, meaning that $t = 7$ did not actually give $4\mathbf{I}$ consistently for their $\mathbf{AB}$. As with question 2, the word "deduce" in part (b) was almost totally ignored, and alternative methods for finding an inverse, often taking up lots of time, received no credit.

Question 4

This question was surprisingly well attempted, as the algebra that goes with the systems of equations work is usually found tough enough to guarantee lots of mistakes. Almost all candidates found the determinant of the coefficient matrix in part (a) and solved the resulting quadratic equation with ease. Other approaches generally got nowhere. The work in part (b) was also competently attempted by the majority, apart from silly arithmetical slips which again probably would have been noticed had a very quick check been made.

Question 5

Rather bizarrely, the final bit of part (a) proved to be the most common difficulty on the paper. Having found the image of $(x, 2x + 1)$ to be $(x - 1, 2 - x)$, hardly anyone managed to deduce that the equation of the image-line was $y = 1 - x$. Parts (b) and (c) were handled very well indeed, although a few candidates tried $\mathbf{BA}$ rather than $\mathbf{AB}$ in part (c).

The message as to what is an acceptable way to describe a shear has been stated often in recent years' reports, and this message has clearly been picked up by nearly all centres: the mapping of a point (not on the line of invariant points) to its image was noted far more regularly than in previous sessions, though there are still some rather spurious references to scale factor — 'spurious' in that it is not easy to assign to it an obvious significance or role in the proceedings; indeed, it is not easy even to decide what it is in cases where the shear is not parallel to one of the coordinate axes.

Questions 6 and 7

The structure of these questions proved very helpful to candidates, and those who were reasonably careful could generally score at least 13 of question 6's 16 marks and 16 of question 7's 18 marks without any difficulty. The main hurdle arose in question 6, where many candidates failed to realise in part (b) that they had already worked out the eigenvalues of $\mathbf{M}$ in part (a), and thus they went ahead and started all over again in an effort to find, and then solve, a cubic characteristic equation. This was all a bit of a waste of time and frequently not as successful as their former effort.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the **Results statistics** page of the AQA Website.