General Certificate of Education

Mathematics 6360

MFP1 Further Pure 1

Report on the Examination

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General

Most of the candidates showed a good grasp of most of the topics covered in this paper. The style of question paper/answer booklet, not previously used in MFP1, did not seem to cause any difficulty at all. In Question 4 it was much more convenient than having to use an insert. In Question 6 many candidates tended to use a great deal of space in their matrix calculations and therefore needed an extra sheet of paper. This will be borne in mind for future examinations.

Some of those who take this paper have a good knowledge of the mathematics but lack the maturity to find the most efficient methods to solve the problems. This applies to almost every question on the paper. An indirect approach can often lead to full marks, but a candidate who uses longer methods on every question may well find time running short at the end of the examination.

Question 1

Most candidates scored high marks on this opening question, though there were some who seemed to have no idea what to do. A mark was often lost by carrying out an unwanted fourth iteration. A small number of candidates used the upper boundaries of the intervals rather than the lower boundaries. This was accepted for full marks, but credit was lost if the candidate switched from one method to the other in the course of working through the solution.

Question 2

The great majority of candidates showed that they had the necessary knowledge of complex numbers to cope with this very straightforward question. In a distressingly high number of instances the work was marred by elementary errors in the algebra, most commonly by a sign error causing $-z^*$ to appear as $-x - \mathrm{i}y$. Many candidates also failed to indicate clearly in part (a) which were the real and imaginary parts, though many recovered the mark by using the real and imaginary parts correctly in part (b) of the question.

Question 3

Most candidates introduced a term $360n°$ into their work at some stage, sometimes at a very late stage indeed, but credit was given for having some awareness of general solutions. A number of candidates gave the equivalent in radians, even though the question specified that degrees were to be used in this case.

Marks were often lost by the omission or misuse of the ‘plus-or-minus’ symbol. In some cases this was introduced too late, after the candidate had reached the stage of writing ‘$5x = 60°$’. In other cases the symbol appeared correctly but then ‘$\pm\ 40 + 20$’ became ‘$\pm\ 60$’.

Question 4

High marks were almost invariably gained in this question. In particular the first three marks were earned by almost all the candidates. Part (c)(i) was often answered without any sign of awareness of a distinction between x and X, a distinction which is of the utmost importance in this type of question.

In part (c)(ii) many candidates used calculations based on pairs of coordinates found in the table, but this was accepted as these coordinates could equally have been found from the graph. The value of b often emerged inaccurately from these calculations, though the candidate could so easily have used the y-intercept.

Question 5

As has happened in past papers on MFP1, the expansion of the cube of a binomial expression involved some lengthy pieces of algebra for many candidates, though the correct answer was

often legitimately obtained. Most candidates were then able to put all the necessary terms into the formula for the gradient of a straight line and obtain the required answer correctly.
There was a good response to part (b), where many candidates stated correctly that h must **tend** to zero. Only rarely did they say, inappropriately, that it must be *equal* to zero.

Question 6

High marks were often earned in this question, generally from the multiplication of the matrices rather than from the geometrical explanations, which tended to be shaky. In parts (c) and (d) the vast majority of candidates calculated a matrix product rather than base their answers purely on the transformations already found in parts (a) and (b). The transformation in part (c) was often given as a reflection rather than a rotation, and in part (d) many candidates stated that the matrix was the identity matrix but did not make any geometrical statement as to what this matrix represented. In part (e) the correct matrix was often obtained but the candidates failed to give the correct geometrical interpretation, or in some cases resorted to a full description of the transformation as a combination of the reflection and rotation found in parts (b) and (a). When this was done correctly, full credit was given.

Question 7

The first eight marks out of the ten available in this question were gained without much difficulty by the majority of candidates, apart from some careless errors such as omitting to indicate the coordinates asked for on the sketch.

By contrast the inequality in part (b)(ii) was badly answered. Few candidates seemed to think of reading off the answers from the graph, the majority preferring an algebraic approach, which if done properly would have been worth much more than the two marks on offer. The algebraic method usually failed at the first step with an illegitimate multiplication of both sides of the inequality by $x - 3$. Some candidates multiplied by $(x - 3)^2$ but could not cope with the resulting cubic expression.

Question 8

This was another well-answered question. The first two parts presented no difficulty to any reasonably competent candidate. In part (c) some candidates, faced with the task of finding the sum of the roots of the required equation, repeated the work done in part (b) rather than quoting the result obtained there. The expansion of the product of the new roots caused some unexpected difficulties, some candidates failing to deal properly with two terms which should have given them constant values. The final mark was often lost by a failure to observe the technical requirements spelt out in the question.

Question 9

The sketch of the parabola P was generally well attempted. When asked to sketch two tangents to this parabola, many candidates revealed a poor understanding of the idea of a tangent to a curve.

Part (b) was found familiar by all good candidates, and parts (b)(i) and (b)(ii) yielded full marks provided that a little care was taken to avoid sign errors. Part (b)(iii) was more demanding but many candidates found their way to earning at least some credit, either by substituting the value of m^2 into the quadratic found in part (b)(i) or by some more roundabout method.

Mark Ranges and Award of Grades

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