Version : 1.0 0607

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Mathematics 6360

MFP1 Further Pure 1

Report on the Examination

2007 examination - June series

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Set and published by the Assessment and Qualifications Alliance.

General

There was a welcome increase in the number of candidates taking this paper. The quality of the work was generally very high. The candidates had opportunities, in Questions 3, 4, 5, 6 and especially 9, to show their algebraic skill and the response to these questions was good. However, there were one or two widespread errors which sometimes cost a number of marks.

Question 1

This question was generally well answered. The most common errors were in part (b), where the mirror line was given as $y = x$ rather than $y = -x$. It was, however, acceptable to give this reflection in conjunction with an enlargement with scale factor -3.

In part (c) some candidates omitted the factor 3 before carrying out the matrix multiplication, while others multiplied incorrectly to obtain the 9s and 0s in all the wrong places.

Question 2

Almost all the candidates were able to make a good start to this question, though some were unable to draw a proper conclusion in part (a). In part (b) the response was again very good. The most common error was not understanding what exactly was being asked for at the end of the question. If it is known that the root lies between 1.7 and 1.75, then it must be 1.7 to one decimal place. But many candidates gave no value to one decimal place, or gave a value of the function (usually 0.1) rather than a value of x.

Question 3

Although most of the candidates who took this paper are good at algebra, there are still quite a number who made elementary sign errors. The fourth term of the expansion in part (a) frequently came out with a plus instead of a minus. The error of including an 'i' in the imaginary part was condoned.

In part (b) some candidates seemed not to realise that they needed to equate real and imaginary parts, despite the hint in part (a). Others used 16 for both the real and imaginary parts of the right-hand side of the equation. But a large number solved correctly to obtain full marks. Those who had made the sign error already referred to were given full marks in part (b) if their work was otherwise faultless.

Question 4

Most candidates answered this question very well. Only a small number of candidates gave the wrong sign for the sum of the roots at the beginning of the question. Rather more made the equivalent mistake at the end of the question, giving the x term with the wrong sign. Another common mistake at the end of the question was to omit the 'equals zero', so that the equation asked for was not given as an equation at all.

Question 5

The great majority of candidates gave the correct values to three decimal places in part (a). Most of them coped efficiently with the logarithmic manipulation in part (b), but occasionally a candidate would treat the expression ab^x as if it were $(ab)^x$, resulting in a loss of at least four marks, as it was now impossible to distinguish validly between a and b.

The plotting of the points on the graph was usually well done, but some candidates misread the vertical scale here, and again in part (d) when they attempted to read off the intercept on the Y-axis. Some candidates failed to use this intercept, resorting instead to more indirect methods of finding a value for $\log a$. Methods for finding the gradient of the linear graph were equally clumsy. Some candidates, even after obtaining a correct equation in part (b), did not realise that the taking of antilogs was needed in part (d).

Question 6

As in past MFP1 papers, the question on trigonometric equations was not as well answered as most of the other questions. The use of radians presented a difficulty to many candidates, who seemed to have met the idea but not to have become really familiar with it. Most candidates knew that for a general solution it was necessary to introduce a term $2n\pi$ or something similar somewhere in the solution. Many, however, brought in this term at an inappropriate stage. Some had learnt by heart a formula for the general solution of the equation $\sin x = \sin a$, but applied it incorrectly. Many candidates earned 4 marks out of 6 for working correctly from one particular solution to the corresponding general solution, but omitting the other particular solution or finding it incorrectly.

Question 7

Many candidates scored well on parts (a) and (b) of this question, but relatively few candidates made a good attempt at part (c). In part (a) the asymptotes were usually found correctly, as were the coordinates of the required points of intersection in part (b). The graph in part (b) was usually recognisable as a hyperbola, or at least as one branch of a hyperbola, the other branch not being seen. In part (c) many candidates resorted to algebraic methods for solving inequalities rather than simply reading off the solution set from the graph. These algebraic methods, more often than not, were spurious.

Question 8

This question proved to be very largely a test of integration. Many candidates answered part (a) without any apparent awareness of a limiting process, but full marks were awarded if the answer was correct. The positive indices meant that the powers of x would tend to zero as x itself tended to zero.

In part (b) a slightly more difficult integration led to one term having a negative index. Three marks were awarded for the integration, but for the final mark it was necessary to give some indication as to which term tended to infinity. Many candidates did not gain this last mark, but it was sad to see how many did not gain any marks at all in part (b). This was usually for one of two reasons. Either they failed to simplify the integrand and carried out a totally invalid process of integration, or they saw that the denominator x of the integrand would become zero and said that this made the integral 'improper' and therefore incapable of having any value. Since it was stated in the question that **both** integrals were improper, this comment failed to attract any sympathy from the examiners.

Question 9

This final question presented a varied challenge, mostly focused on the algebraic skills needed to cope with the quadratic equation printed in part (c) of the question − deriving this equation from two other equations and then using the discriminant of the equation to find the cases where the ellipse would touch the line. Many candidates were well prepared for this type of question and scored heavily, though with occasional errors and omissions.

Part (e) of the question was often not attempted at all, or the attempts were totally incorrect, involving transformations other than translations parallel to the x-axis. In some cases only one of the two possible cases was illustrated, usually the one where the ellipse touched the straight line on the lower left side of the line, but an impressive minority of scripts ended with an accurate portrayal of both cases.

Mark Ranges and Award of Grades

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