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General Certificate of Education

Mathematics 6360

MFP1 Further Pure 1

Report on the Examination

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General

Once again there were many excellent performances from the candidates on this paper. Only a small minority of candidates seemed to find themselves unable to tackle some of the questions.

As in previous papers on MFP1 the candidates showed a good level of accuracy in algebraic manipulation, but it was noticeable that many of them seemed to be unfamiliar with the expansion of expressions such as $(x + y)^3$, which meant that they had to work things out directly, with an expenditure of time and effort and some risk of errors.

Even more serious was a widespread failure in Question 4(a) to take out the common factors n and $n + 1$ from the two terms in the candidates' correct expressions: many candidates put themselves to enormous trouble by expanding and simplifying the terms and only then looking for factors.

Question 1

The great majority of candidates found this question a good starter and obtained full marks without too much trouble. Careless errors sometimes caused candidates to miss out on one of the method marks for the question.

Question 2

This question provided most candidates with a further five marks. The most common error was to carry out three iterations instead of only two, which would usually cause the loss of only one mark as long as the working was fully shown; though of course the candidate may well have lost valuable time carrying out the unwanted calculations.

Question 3

As usual in MFP1, many candidates were not thoroughly prepared for the task of finding the general solution of a trigonometric equation. The most common approach was to find (usually correctly) one value of x and then to add a term $n\pi$ to this value. Many candidates showed only a slight degree of familiarity with radians, and there were some cases of serious misunderstanding of the implied order of operations in the expression $\tan 4\left(x - \frac{\pi}{8}\right)$.

Question 4

Part (a) As in the previous question, many candidates were not sufficiently familiar with the techniques needed to carry out the necessary manipulation efficiently. It was noticeable that many candidates still obtained full marks despite their failure to spot the quick method of taking out common factors at the earliest opportunity. A common mistake was to omit the numerical factor $\frac{1}{4}$, or to replace it with some other number such as 4.

Part (b) Good attempts at this part of the question were few and far between. Many candidates made no attempt at all. Some came to a halt after replacing n by 1000 in their answer to part (a). Those who found a factor 1004 usually went on to try to explain how this would lead to a multiple of 2008, but more often than not their arguments lacked cogency.

Question 5

The oblique asymptotes of a hyperbola were not always known by the candidates, though many found the necessary general equations in the formula booklet and correctly applied them to this particular case. Part (b) was very well answered by almost all candidates, while part (c) usually provided some further marks, the most common error being to use $y + 2$ instead of $y - 2$ in the equations of the translated hyperbola and asymptotes.

Question 6

Part (a)(i) of this question was almost universally well answered, but part (a)(ii) led to some very slipshod and unclear reasoning. In part (b)(i) many candidates did not appreciate that the scale factor of the enlargement must be the same as the value of q obtained in the previous part. In part (b)(ii) a common mistake was to use tan 60° in finding the gradient of the mirror line instead of halving the angle to obtain tan 30°. Answers to part (c) were mostly very good, even from candidates who had been struggling with the earlier parts of the question.

Question 7

Most candidates performed well in this question.

Part (a)(i) seemed to present a stiff challenge to their algebraic skill, though they often came through the challenge successfully after several lines of working. Part (a)(ii) again proved harder than the examiners had intended, some candidates having to struggle to evaluate the y-coordinate of the point A. Again the outcome was usually successful, though a substantial minority of candidates used differentiation of the answer to the previous part. In part (a)(iii) it was pleasing to see that a very good proportion of the candidates correctly mentioned h 'tending to' zero rather than 'being equal to' zero, which was not allowed, though the correct value of the gradient could be obtained by this method and one mark was awarded for this.

The responses to part (b) suggested that most candidates were familiar with the Newton-Raphson method and were able to apply it correctly, but that they lacked an understanding of the geometry underlying the method, so that they failed to draw a tangent at the point A on the insert as required, or failed to indicate correctly the relationship between this tangent and the x-axis.

Question 8

This question proved to be an excellent source of marks for the majority of candidates, apart from the discriminating test provided by part (c). Many candidates seemed to be familiar with the techniques relating to the cubes of the roots of a quadratic equation, though some struggled to find the correct expression for the sum of the cubes of the roots, while others lost marks by not showing enough evidence in view of the fact that the required equation was printed on the question paper.

Parts (a)(ii) and (b) proved straightforward for most candidates, but only a few were able to give a clear explanation in part (c), where many candidates claimed that the original roots α and β must be equal.

Question 9

Most candidates scored well in parts (a) and (c) of this question. Many wrote down the equations of the two vertical asymptotes without any apparent difficulty, but struggled to find the horizontal asymptote, although in most cases they were successful. The sketch-graph in part (c) was usually drawn correctly.

Part (b) was a standard exercise for the more able candidates. No credit was given for asserting that because $x = 0$ and $x = 4$ were asymptotes, it followed that $x = 2$ must provide a stationary point. A carefully reasoned argument based on the symmetry of the function in the denominator would have earned credit, but most candidates quite reasonably preferred to adopt the standard approach.

Mark Ranges and Award of Grades

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