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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 on this paper. Most candidates were able to make a good attempt at all the questions, although in two questions their attempts were not generally very successful. These were Question 5 on trigonometrical equations, where as usual there was a poor response, and Question 8 on transformations and matrices, which many candidates found unfamiliar.

As in previous MFP1 papers the candidates showed a good standard of accuracy in algebraic manipulation, but often failed to use the most efficient methods. An example of this came in Question 2 (b), where two simultaneous linear equations with numerical coefficients were tackled by substituting for x or y rather than by adding or subtracting multiples of the equations. Later, in Question 9 (b), a substitution method *was* appropriate, but the elimination of x was much simpler if the x from the equation of the parabola was substituted into the equation of the straight line rather than the other way round.

Question 1

The great majority of candidates showed a confident grasp of the algebra needed to deal with the sum of the squares of the roots of a quadratic equation, and answered all parts of this question efficiently. The only widespread loss of credit came in the very last part, where many candidates failed to give integer coefficients or else found a quadratic expression but without the necessary '= 0' to make it an equation.

Question 2

Here again most candidates answered confidently and accurately. In part (a) many failed to state clearly which was the real part and which the imaginary part, though they recovered ground by using the correct expressions in part (b). As already stated, the solution of the simultaneous equations was often attempted by a substitution method.

Whichever method was used, numerical and sign errors were fairly common, but most candidates obtained the correct values for x and y. Two faults which were condoned this time were, in part (a), the retention of the factor ' i ' in the imaginary part, and, in part (b) following correct values of x and y, a failure to give the final value of z correctly.

Question 3

There were many all-correct solutions to this question from the stronger candidates. Others were unsure of themselves when dealing with the behaviour of powers of x as x tended to infinity. Many others did not reach the stage of making that decision: either they failed to convert the integrands correctly into powers of x, or they integrated their powers of x incorrectly. A reasonable grasp of AS Pure Core Mathematics is essential for candidates taking this paper.

Question 4

In part (a) most candidates simply wrote down the given equation, multiplied through by $(x + 2)$, and converted the result into X and Y notation. This was all that was required for the award of the two marks, but some candidates thought that more was needed and presented some rather heavy algebra. Some candidates lost credit because of a confusion between the upper- and lower-case letters.

Parts (b)(i) and (b)(ii) were usually answered correctly on the insert, after which most candidates knew how to find estimates for a and b, occasionally losing a mark through a loss of accuracy after a poor choice of coordinates to use in the calculation of the gradient. Another way of losing a mark was to write down the estimate for a without showing any working.

Question 5

As usual in MFP1, many candidates made a poor effort at finding the general solution of a trigonometric equation. In this case the solution $x = \frac{\pi}{4}$ was almost always found in part (a), but the second solution $x = -\frac{\pi}{4}$ (or alternative) was relatively rarely seen. Many candidates were aware that when dealing with a cosine they needed to put a plus or minus symbol somewhere but were not sure where exactly it should go. The general term $2n\pi$ usually appeared, but often in the wrong place.

In part (b) only the strongest candidates, and not even all of these, were able to obtain any credit here.

Question 6

This question was very well answered by the majority of candidates, who showed confidence and accuracy in manipulating these simple matrices.

Question 7

Many candidates scored well on this question but, for some, marks were lost in a variety of places.

In part (a) some candidates were careless in giving the two parts of the translation.

In part (b) (i) the horizontal asymptote was often found to be the x-axis, which usually caused difficulty in part (c). In part (b)(ii), as in Question 4 (b)(iii), a mark was sometimes lost by a failure to show some necessary working, in this case for the intersection of the curve with the x-axis.

In part (c) the sketches were sometimes wildly wrong, despite the information provided in part (a) that the curve must be a translated version of the well-known hyperbola $y = \frac{1}{x}$. In many cases the curve shown was basically correct but did not appear to approach the asymptotes in a satisfactory way. Despite a generous interpretation of this on the part of the examiners, some candidates lost credit because of seriously faulty drawing.

Question 8

This question was not generally well answered, except for part (b) where most candidates were able to draw the reflected triangle correctly on the insert. In part (a) many candidates seemed not to recognise the transformation as a simple one-way stretch, and even those who did were not always familiar with the corresponding matrix. They could have worked out the matrix by considering the effect of the stretch on the points (1, 0) and (0, 1), but in many cases candidates either gave up, made a wild guess, or embarked on a lengthy algebraic process involving four equations and four unknowns.

In part (c) relatively few candidates saw the benefit of matrix multiplication for the composition of two transformations, and even they often multiplied the matrices the wrong way round. Again it was common to see candidates trying to find the matrix from four equations, but this method was doomed to failure if the candidate, as happened almost every time, paired off the vertices incorrectly.

Question 9

Most candidates know that there is likely to be a question involving quadratic theory and are well equipped to answer it. In this case it was possible to answer parts (c) and (d) without having been successful in the earlier parts of the question, and this was often seen. At the same time there were many candidates who did well in parts (a) and (b) but made an error in the discriminant in part (c) leading to a significant loss of marks thereafter.

In part (a) many candidates found a particular value for m rather than finding an equation that would be valid for all values of m. In part (b), as mentioned above, the elimination was not always carried out by the most efficient method, but many candidates still managed to establish the required equation. In part (c) some candidates lost all credit by failing to indicate that the discriminant must be zero for the line to be a tangent to the parabola; while others found the two gradients correctly but omitted the actual equations asked for in the question.

Those who did find the correct gradients nearly always went on to gain all or most of the marks available in part (d), from a quadratic in y (the more direct way) or from a quadratic in x.

Mark Ranges and Award of Grades

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