ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Mathematics 6360

MPC2 Pure Core 2

Report on the Examination

2008 examination - January series

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Set and published by the Assessment and Qualifications Alliance.

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General

The presentation of work was again very good. Most candidates answered the questions in numerical order and completed their solution to a question at the first attempt. In general, most candidates found the first six questions (with the exception of Question 5(a)(v)) to be straightforward but then found the last three question to be a significant challenge.

Once again, too many candidates did not complete the boxes on the front cover to indicate the numbers of the questions they had answered.

Teachers may wish to emphasise the following points to their students in preparation for future examinations in this unit.

- In Question 3(a), to show a printed value quoted to one decimal place, it is necessary to calculate a value to at least two decimal places.
- The demand "express $(1+x)^3$ in ascending powers of x" requires the full four term expansion $1 + 3x + 3x^2 + x^3$ and not just the term $3x$ nor the partial answer $3x + 3x^2 + x^3$.
- The correct terminology should be used when describing geometrical transformations. "Translation $\begin{bmatrix} -1 \\ 0 \end{bmatrix}$" was a correct description for the required transformation in Question 8(b)(ii) but "Transformation $\begin{bmatrix} -1 \\ 0 \end{bmatrix}$" was only awarded partial credit. Consequently, "Tr." is not an acceptable alternative for "Translation".

Question 1

The vast majority of candidates were able to quote and use the correct formulae for the area of the sector and for the arc length, and most obtained both correct answers. Otherwise, the most common error in part (a) was to form the equation incorrectly, by writing "$2\times18 = \frac{1}{2}r^2\theta$", before making a second error to obtain the printed answer. In part (b), a very small minority left the perimeter as 3 cm.

Question 2

Parts (a) and (b) were answered very well with far fewer candidates than in previous years confusing the formulae for the nth term of an arithmetic series with that for the sum of the series to n terms. In part (c), those candidates who considered the sum of the last 100 terms as an arithmetic series, with first term 751 and last term 1444, were generally more successful than those candidates who considered it as $S_{200} - S_{100}$. In the latter case, the correct value, 149500, for S_{200} was usually found, but the common error in finding S_{100} was to take the last term as 1444 rather than 744.

Question 3

In part (a), the vast majority of candidates quoted and used the sine rule correctly, but once again a significant number failed to show sufficient detail in their working to justify the printed answer to the degree of accuracy quoted. The examiners were looking for at least a calculated value of a relevant product or quotient, following a rearrangement, to be shown to two decimal places or more before the printed answer was stated.

The area of the triangle, required in part (b), was often found correctly, although some candidates used the much longer method of finding the length of AB and the length of the perpendicular from C, rather than finding angle C and using $\frac{1}{2}ab\sin C$.

Question 4

The trapezium rule was usually well understood, with far fewer candidates than in previous years mixing up "ordinates" and "strips". In general, candidates' answers on this topic were better than in previous sessions.

Question 5

Generally, most candidates scored relatively high marks for this long structured calculus question. Parts (a)(i), (ii) and (iii) were answered very well, although some used the gradient of the normal in part (a)(iii) as -2 and so in part (a)(iv) obtained a positive value for the y-coordinate of Q. A glance at the diagram should have indicated that such a value was incorrect.

Part (a)(v), which required candidates to find the x-coordinate of the maximum point, M, was generally not answered with any confidence. To score any marks for this part, candidates were required to go beyond just equating their answer for part (a)(i) to zero. Many candidates again incorrectly believed that for a maximum point the second derivative was zero. Candidates generally found the correct answer to the indefinite integral in part (b)(i), but a significant minority forgot to add the area of the triangle to their 'area under the curve' in part (b)(ii) of the question.

Question 6

Those candidates who used Pascal's triangle were generally able to find both expansions in part (a). Other candidates generally used the formulae booklet but some of these failed to display an understanding of the notation involved and were penalised heavily. In part (b), many candidates realised how to use their earlier expansions but the omission of brackets was a common error which led, for example, to the wrong answer "$1 + 12x + 12x^2 + 4x^3$" in part (b)(i). Although some candidates did not attempt part (c), the vast majority used the correct method, although some careless arithmetic errors were seen.

Although the wording of the question has appeared in similar questions in past MPC2 papers (for example June 2005 Question 6(a)), there were a significant minority of candidates who just gave the answers (a)(i) $3x$ (ii) $4x$ (b)(i) $12x$ (ii) $12x$, but then many of these candidates, in their working for part (c), provided the full correct expansions required in part (b). In these cases the examiners awarded the marks for part (b) in part (c).

Question 7

Many candidates gave a correct solution for part (a) but only a minority gave full correct solutions to part (b). Average grade candidates in general obtained the method marks for applying two logarithmic laws correctly but only the more able candidates could deal with the constant 1 correctly. Instead of writing 1 as $\log_a a$, the common wrong approach was to write $\log_a 36 + 1$ as $\log_a 37$.

Question 8

In part (a), many candidates gave the correct value for where the curve met the y-axis, but a significant minority drew no part of the graph in the second quadrant, their graphs stopping at the point (0, 1). Many candidates scored at least half marks for their descriptions of the geometrical transformations in part (b). The most common wrong answer in part (b)(i) was "a stretch of scale factor 2 parallel to the y-axis", and in part (b)(ii) the direction of the translation vector caused the most problems.

Part (c)(i) was poorly answered, with many candidates failing to give sufficient justification for the printed answer. A very common error was to write 9^x as $3y$ and yet still reach the correct factorised quadratic equation.

Although part (c)(ii) was answered better, the majority of candidates failed to gain all the four marks. The most common wrong approach was to take logarithms of each term in the given equation. Those candidates applying this incorrect method had clearly not seen the implication of the "Hence". Those candidates who had seen the link and started with $3^x = 1$ and $3^x = 2$ generally scored all four marks.

Question 9

In general candidates found this question difficult, and average-grade candidates rarely scored more than a couple of marks. In part (a), the mark for knowing the correct trigonometrical identity was frequently gained by those who attempted the question, but then many floundered after making the common error "$3 + 1 - \cos^2\theta = 3 - 3\cos^2\theta$".

It was encouraging to find a higher proportion of candidates than usual using the printed answer from part (a), even though they could not obtain it, to start their solution to part (b). Those who realised that θ should be replaced by $3x$ often obtained the 40° solution, but a significant number of these candidates could not then find the remaining two solutions in the given interval.

Mark Ranges and Award of Grades

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