Version 1.0: 0108

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Mathematics 6360

MPC3 Pure Core 3

Report on the Examination

2008 examination - January series

Set and published by the Assessment and Qualifications Alliance.

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General

The paper was accessible to the majority of the candidates; few very low marks were seen. Many candidates appeared to have been well prepared and were able to score high marks. The majority of candidates seemed to have managed their time well; few incomplete scripts were seen.

Question 1

Part (a)(i) was well answered by the majority of candidates. Many fully correct responses were seen, and, if there were errors, it was usually through further incorrect work or by the omission of brackets.

Very few incorrect responses were seen to part (a)(ii). Most candidates appeared to be able to use the product rule successfully. Some errors with signs were made, leading to the loss of the accuracy mark.

Part (b) was very well answered.

Question 2

Part (a) was well answered by the majority of candidates. $\text{Tan}\, x = 0.5$ and $x = 0.46, 3.60$ was a common error. The second angle was often incorrect. Few cases of angles in degrees were seen.

In part (b), most candidates used the correct identity and were successful in answering this part of the question. The main error was $\text{cosec}^2 x = \cot^2 x - 1$ followed by fudging of the rest of the solution.

In part (c), most candidates attempted to factorise the quadratic expression, although some used the quadratic formula. Those who factorised were usually correct, although solutions of ½ and -2 were not uncommon. Those who used the formula often made the error of $\cot^2 x = 2$ or $\cot^2 x = -0.5$. Candidates with 3.60 as a solution in (a) were able to recover here but often failed to obtain both marks; 5.17 was a common error.

Question 3

Part (a) of this question was reasonably well answered with most candidates obtaining the method mark for substitution of the two given values. Some candidates then lost the accuracy mark through inaccurate evaluation, although the main reason for the loss of the final mark was that many candidates just stated "change of sign therefore root" without stipulating that $-0.33 < \alpha < -0.32$.

Part (b) was answered very badly. $x^4 + (1+3x) = 0$ was a common error as was $(1+3x)^{1/4} = -x$, which then became $(1+3x) = -x^4$. This part was omitted on many scripts.

Most candidates were able to score full marks on part (c), with the correct answer often seen. One error was to write the final answer to two decimal places as -0.33. The other main error was calculating -0.33^4 and not $(-0.33)^4$ for x_n^4 in the numerator.

Question 4

Part (a) was not very well answered with many candidates putting $x = \mathbf{R}$. "$x > 0$" was also common.

Part (b)(i) was very well answered.

Part (b)(ii) was answered well by the majority of candidates. Errors were made by those candidates who produced further working in part (b)(i), and hence tried to work with expressions such as $\frac{1}{x^3 - 27}$. Other common incorrect responses were seen, such as $x = 7$ through mishandling of the 3.

Part (c)(i) was very well answered by the majority of candidates, although $\frac{1}{x} - 3$ was a common incorrect response, which lost the accuracy mark.

Part (c)(ii) was quite well answered with many correct solutions seen. Common incorrect responses were $f(x) \neq 0$ and $f(x) \neq -3$.

Question 5

Part (a)(i) was well answered.

Candidates who saw the connection with part (a)(i), usually made a very good attempt at part (a)(ii), often with complete success. Limits did cause a problem where candidates had not bracketed $2x^2 - 8x + 3$, and some candidates did not leave the answer in the required form but left their answer as $\frac{1}{4}\ln 9$.

Part (b) was well answered by candidates who were able to write the integral in terms of u successfully. Many candidates lost a mark through omission of either $\mathrm{d}u$ or c. A disturbing number of candidates thought that $\frac{1}{3} \times \frac{1}{3} = \frac{1}{6}$. Some clearly able candidates lost the last mark by spoiling an otherwise acceptable answer.

Question 6

Many candidates lost marks on this question through careless work or a failure to write answers to the correct degree of accuracy.

In part (a), most candidates produced the correct shaped response, but many lost the accuracy mark by failing to indicate the coordinates of the minimum point.

Part (b) was generally well answered. The majority of candidates attempted the mid-ordinate rule, and many fully correct responses were seen. Errors occurred in working with three significant figures and in writing the final answer to an inappropriate degree of accuracy. An answer of 1.60 was a very common error.

Question 7

Part (a) was not very well answered, with few candidates gaining all 4 marks. The most common problem was an inability to give the appropriate scale factor when stretching in the x-axis.

Part (b) was well answered. Marks were often lost due to the quality of the sketch.

In part (c)(i), there were many fully correct responses, but marks were frequently lost because candidates only gave the positive values of ½ or 1.5.

Part (c)(ii) was not very well answered; $-\frac{1}{2} \leq x \leq \frac{1}{2}$ was the most common way of getting 1 mark. Many incorrect solutions involving the two positive solutions were seen.

Question 8

Part (a) was well answered by the majority of candidates. A common error was $x = -\ln\frac{3}{2}$.

The integration by parts in part (b) was well done, with many candidates achieving full marks. There were a few candidates who used $u = e^{-2x}$ and $dv = x$ and hence produced a more complicated expression, although there were fewer this session than in the past.

In part (c)(i), many candidates obtained the correct derivative and went on to obtain the correct x-coordinate. Unfortunately they then lost marks by not finding the appropriate y-value. Candidates who made earlier errors were usually able to obtain some credit from a correct method.

In part (c)(ii), most candidates at least obtained the method mark, and many using the correct exact value of x successfully completed the question.

In part (c)(iii), most candidates achieved the method mark and many went on to get the mark for the expansion, although e^{4x} and e^{4x^2} were common errors for the first term. The integration was poorly done with most candidates failing to realise that they could use their earlier result from part (b). Some fully correct solutions were seen.

Mark Ranges and Award of Grades

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