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General Certificate of Education

Mathematics 6360

MPC3 Pure Core 3

Report on the Examination

2009 examination - June series

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General

The overall impression of the examination was that it was accessible to the majority of the candidates with few very low marks being seen. Most candidates appeared to have been well prepared, being able to score high marks. The majority of candidates seemed to have managed their time well with few incomplete scripts seen. General carelessness was not as noticeable as in the past but many candidates displayed a cavalier approach to the use of brackets.

Question 1

Part (a)(i) was not very well answered by the majority of candidates. Fully correct responses were seen but it was usually from candidates who successfully rearranged the equation into the form $f(x) = 0$, which was seen in a number of acceptable forms. Where candidates simply substituted in the two values given into the LHS they obtained 1 and 0 but still indicated that this was a change of sign and therefore there was a root. Most candidates achieved at least one mark but lost the second by simply stating change of sign therefore a root.

Very few incorrect responses were seen in part (a)(ii).

Part (a)(iii) was very well answered. The main error was with the candidates who used degrees rather than radians

Part (b)(i) was very well answered, with most candidates successfully using the quotient rule. Where errors occurred it was usually through missing brackets, although many candidates were able to recover at some stage in the working.

As part (b)(ii) followed on from part (i) most candidates were able to obtain the mark for substitution; even those who had incorrectly simplified their work. Many fully correct responses were seen. Several candidates also stopped after the substitution of $x = 0$ and left their answer as -2.

Question 2

Part (a) was not very well answered by the majority of candidates. Errors occurred due to poor notation.

Part (b)(i) was very well answered, with most candidates achieving full marks.

Part (b)(ii), like part (a), was not very well answered, with poor notation.

Part (c)(i) was well answered, although candidates often spoiled their work with incorrect subsequent working which was then penalised in the next part.

Many totally correct responses were seen in part (c)(ii) and those candidates who worked with an incorrect $h(x)$ often achieved the method mark for squaring. A common error was to substitute $x = 3$ into $h(x)$.

Question 3

Most candidates obtained the method mark in part (a) by obtaining -0.32. Many candidates went on to complete this part correctly, although incorrectly writing their answer to 2dp was a common error. Answers in degrees were not common, but they were seen.

Part (b) was answered very well by the majority of candidates with the correct trigonometric identity being used.

In part (c) most candidates were able to successfully factorise the quadratic expression, and many went on to complete the question correctly. Marks were lost by 'extra' values being given or poor accuracy of writing their answers to 2dp.

Question 4

Candidates scored well on this question, with many correct graphs seen in part (a). Where candidates only scored 2 marks it was generally the curvature beyond $\sqrt{50}$ which was at fault.

In part (b) $x^2 = 36$ was the most common answer to earn the method mark. Many candidates also just gave the two positive solutions of 8 and 6 earning one accuracy mark. Quite a few candidates did come up with all four solutions.

Part (c) was not very well answered. The inequalities for $x < -8$ and $x > 8$ were often seen but $-6 < x < 6$ was not often encountered.

In part (d) most candidates knew they needed a reflection and a translation, gaining two of the marks, but often had the translation first and hence the corresponding line of reflection was incorrect.

Question 5

This question proved to be the downfall for many of the candidates. It was the poorest answered question on the paper.

Many candidates answered part (a) correctly with the correct answer often seen. A common error was not to give the answer in an exact form, but this only affected candidates who showed no working. The solution $x = \ln(5/2)$ was also common.

In part (b) the only candidates who were really successful here were the ones who used a substitution such as $y = \ln x$, who then were able to formulate and solve the quadratic very easily. Those candidates who attempted to work in $\ln x$ usually (despite condoning poor notation) failed to obtain a quadratic and hence scored zero. Many candidates just substituted $2\ln x = 5$ and verified that it fitted the equation.

Question 6

Many candidates lost marks on this question from careless work. Some candidates scored very well on this question and full marks were not uncommon amongst the more able candidates.

Many candidates obtained full marks in part (a). Where candidates scored 4 out of 5 it was generally because at no stage did they indicate 'dy' and hence lost the B mark. A very common error was in $\int (100-y^2)dy$, where the result was often $(100x - y^3/3)$, again with candidates very unsure as to whether they were integrating w.r.t. x or y. Many special cases were seen and, where attempted, candidates often achieved 2 marks. Several candidates found it difficult to isolate x^2.

Although many candidates answered part (b) correctly they often lost the final mark for not writing the answer to 3sf. A common error was also to miss out one of the x values, usually the 0.5. Candidates still seem not to understand that if they require an answer to 3sf then they should be showing either exact values of y or working to 4 sf.

Part (c)(i) was not particularly well answered, although many candidates did have $\frac{1}{2}(100-4x^2)^{-\frac{1}{2}}$ and earned the method mark. Various errors occurred with the 8 and the ½ and many candidates lost the negative sign.

In part (c)(ii) those candidates who made an error in part (i) lost marks for this part. Although candidates who followed through with their incorrect gradient gained the method mark, many fudged solutions were seen as $-3/2$ suddenly appeared from nowhere.

Part (d) was quite well answered by most candidates and full marks were often seen. The method of finding the intercepts on the axes was used most frequently, although use of integration was not uncommon. Candidates who integrated often made errors on the limits to be used.

Question 7

Most candidates lost marks on this question. Full marks were not common although they were seen from the more able candidates.

Not many candidates obtained full marks for part (a). Most candidates scored 2 out of 4 since they started correctly by differentiating $\ln t$ and integrating $(t - 1)$. Obvious errors were differentiating both terms or starting by trying to integrate $\ln t$. Several candidates managed to obtain the second accuracy (A) mark for simplification to $(t^2/2 - t) \ln t - \int(t/2 - 1)\, dt$ but lost the final accuracy mark by ending up with a final term of $-t$, not $+ t$.

Part (b) was done well by most candidates, although poor manipulation often cost the loss of the final accuracy mark. Some candidates also confused the issue by trying to introduce terms in u and du.

Part (c) was not very well answered, with candidates failing to change the limits as a common error. Many candidates did not appreciate that they should be using their answer to part (a) and tried to start again, often obtaining different answers to those they had found in part (a). After correctly approaching the choice of u and dv/dt, most were then defeated by the required manipulation of the subsequent algebra.

Mark Ranges and Award of Grades

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