Version : 1.0 0110

General Certificate of Education

Mathematics 6360

MPC3 Pure Core 3

Report on the Examination

2010 Examination – January series

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Set and published by the Assessment and Qualifications Alliance.

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General

The overall impression of the examination from the marking was that it was accessible to the majority of the candidates with only a few very low marks being seen. In general, candidates seemed to score a little less well than in the past, although the mark scheme worked well and rewarded effort fairly. The majority of candidates seemed to have managed their time well with few incomplete scripts seen.

In many cases candidates were not able to take advantage of given results, abandoning their solutions halfway through. However there were occasions where the given answer tempted candidates to get there too quickly without due care or by fudging their working. Simple algebraic errors were common and should not be occurring at this level. General carelessness was more noticeable than in recent papers. There were more mistakes copying work from one page or part to another and many candidates still display a cavalier approach to the use of brackets.

Question 1

Part (a) was well answered by the majority of candidates. Many fully correct responses were seen and, if there were errors, it was usually the final accuracy mark that was lost through the omission of brackets at some stage in the solution.

Part (b) was not answered as well as part (a). Although many candidates were successful in factorising the required quadratic, there were also many solutions which were accompanied by terms in e^{-4x}. Where marks were lost, it was mainly due to incorrect signs, though some candidates did manage to obtain follow through marks.

A few candidates attempted to substitute their values of x back into the derivative rather than y. Many candidates stopped when they had found the two values of x, presumably thinking they had finished the question.

Question 2

In part (a)(i), even though the sketch was often poorly drawn, many candidates obtained full marks, and, where they did not, it was often because sketches went beyond the correct end points. Some correct graphs had the wrong end points marked, reversed coordinates being the most common error. There were however many candidates who had no idea what the graph looked like.

Not all candidates attempted part (a)(ii). Where lines were drawn, they were often not accompanied by sufficient explanation to award the accuracy mark. There were also many instances of lines with a positive gradient intersecting in the third quadrant.

In part (b), where candidates clearly defined which function they were using many achieved full marks. There are still candidates who lose marks by saying “change of sign so the root lies between these two values” without stipulating $0.5 < x < 1$.

Part (c)(i) was usually well answered, with answers given to the required degree of accuracy.

Part (c)(ii) was very well answered with most candidates obtaining both marks.

Question 3

Part (a) was reasonably well answered, with most candidates obtaining both values. Some candidates lost the accuracy mark through inaccurate evaluation of the second angle, with 5.94 being a common incorrect answer. A few cases of $\operatorname{cosec} x = \dfrac{1}{\cos x}$ were seen.

Part (b) was answered very well, with most candidates who obtained full marks in part (a) also obtaining full marks in part (b). The majority of candidates earned the first 4 marks but some then lost the final mark(s) through inaccurate values. There were a few candidates who started with the wrong identity and hence scored zero.

Question 4

Part (a) was well answered by the majority of candidates. The main errors were not crossing the y-axis into the second quadrant or failing to give the points of contact with the axes.

In part (b), most candidates obtained the required two values. In most cases where candidates lost marks, it was for only giving one value, usually 2. Four values of $+2$, -2, $+6$, and -6 was not uncommon.

Part (c) was not as well answered with many candidates trying to write down a single inequality for an answer.

Question 5

Part (a) was very well answered by the majority of candidates. Some candidates lost a mark through not giving the answer to the required degree of accuracy. Candidates losing the final mark had sometimes lost the previous mark by showing their working to insufficient accuracy (usually 3sf). Few attempts at anything other than the mid-ordinate rule were seen.

In part (a)(i), most candidates finished with the required expression though not all had derived it through valid means.

Most candidates obtained some marks on part (a)(ii), and many fully correct responses were seen. The final A mark was often lost because $\mathrm{d}y$ had been omitted. Other errors occurred during the integration, with $\mathrm{e}^y - 5x$ being very common and $\dfrac{\mathrm{e}^y}{y} - 5y$ also being popular.

In part (c), there were very few fully correct expressions seen. Most candidates earned the mark for $+3$, but -3 was also quite common. The main error was dealing with the stretch scale factor 4 parallel to the x axis. Although this was mostly seen correctly as a $\frac{1}{4}$, it was often outside the brackets: $\frac{1}{4}\ln(x^2 + 5)$. The translation was handled much better, although expressions such as $\frac{1}{4}\ln(x^2 + 5) - 3$ were seen.

Question 6

Considerably less than half the candidates gained 2 marks in part (a); $\mathrm{f}(x) > -2$ was common, as was $\mathrm{f}(x) > 3$.

Part (b)(i) was generally well answered with many fully correct responses seen. The majority of candidates earned the mark for swapping x and y. Marks were lost in the attempt to isolate x or y because many candidates could not cope with changing $e^{2x} = y + 3$ into $2x = \ln(y + 3)$, the most common error being ln $y + \ln 3$.

In part (b)(ii), the majority of candidates who had been successful in part (b)(i) and knew that $e^0 = 1$ went on to earn both marks. There did, however, seem to be a significant number of candidates who did not know that $e^0 = 1$.

Part (c)(i) was well answered by most candidates.

Part (c)(ii) was reasonably well answered by the majority of candidates, with many earning full marks. Candidates who had trouble with e^{2x} in part (b)(i) also had the same problems in this part.

Question 7

Part (a) was well answered with many candidates gaining full marks. Where part marks were earned, the most common error was to lose the factor of 4 in the numerator by incorrectly writing the derivatives of $\sin 4x$ and $\cos 4x$ as $\cos 4x$ and $-\sin 4x$.

Many candidates did not attempt part (b). Although fully correct responses were seen, this was the question part where most candidates scored very few if any marks. Where candidates split the term $4\tan^2 4x$ up into $(4\tan 4x)(\tan 4x)$ or similar expressions they seemed to have more success. In general, the use of the chain rule from whatever starting point was not coped with satisfactorily.

Question 8

Part (a) was well answered by many of the candidates. The majority of candidates differentiated the x and integrated the sine function. Those candidates who made an error in the integration were able to gain the method marks. Those candidates who gained the first accuracy mark usually went on to give fully correct solutions. Where candidates gained no marks, it was usually due to setting up the parts incorrectly: it was common to see $u = x\sin$ and $v = 2x - 1$.

In part (b), most candidates made the appropriate start, with $\frac{du}{dx} = 2$. Although fully correct responses were seen, this question part was not very well answered by many candidates. It was essential to substitute for dx, $(2x - 1)$ and x^2 in the integral to earn the second method mark and some omitted the first of these or the integral sign. In putting x^2 in terms of u there were several hurdles: some only substituted for x, many forgot to square the 2 on the denominator, many had $(u - 1)$ instead of $(u + 1)$ and many only had two terms when they attempted to square. Work correct up to this point often did not go any further.

Mark Ranges and Award of Grades

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