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General Certificate of Education

Mathematics 6360

MPC3 Pure Core 3

Report on the Examination

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General

The overall impression of the examination was that it was accessible to the majority of the candidates, with very few marks under 20. Many candidates appeared to have been well prepared, and were able to score very high marks. The majority of candidates seemed to have managed their time well; few incomplete scripts were seen.

Question 1

Part (a) was well answered by the majority of candidates. Many fully correct responses were seen and, if there was an error, it was usually the addition of a function of e^x or a '$+ c$'.

Part (b) was answered very well with many of the candidates gaining full marks, although many then went on to try and simplify their expression, which caused a loss of marks in part (c). Some attempts at the chain rule were seen, quite often resulting in $\frac{x+1}{x}$ as an answer.

Although many correct responses were seen, part (c) was not answered as well as the two previous parts. Most of the errors came from following through from an incorrect expression in part (b). Some candidates found the gradient of the tangent and its equation but not the normal gradient. A number of candidates left their gradients in terms of x.

Question 2

Part (a) was very well answered by the majority of candidates. There were a great number of responses that used the substitution $u = x - 1$.

Part (b) proved difficult for many of the candidates, although fully correct responses were seen. Most candidates gained the first M mark, although $\int x^2 \, \mathrm{d}x$ was seen. Those candidates who evaluated y^2 correctly and realised the significance of part (a) went on to gain most marks, although many omitted π. Most marks were lost by candidates who incorrectly evaluated y^2, to involve powers of $\frac{3}{2}$, and integrated to get powers of $\frac{5}{2}$.

In part (c), most candidates gained part marks. The word 'transformation' rather than 'translation' was common. Many candidates used enlargement rather than stretch; the use of the x-axis, rather than the y-axis, was also common, as was scale factor $\frac{1}{2}$.

Question 3

Part (a) was answered very well by the majority of candidates. Where marks were lost, it was generally for an incorrect or omitted second angle in the interval.

Most candidates were able to answer part (b)(i) successfully. Part (b)(ii) was also very well answered, with few incorrect responses.

Part (c) was not as well answered as the previous parts, with many candidates simply repeating their answer from part (a).

Question 4

Candidates scored well on part (a), with many correct solutions seen. Problems occurred when candidates worked between 0 and 1 rather than 1 and 2, or worked to an insufficient degree of accuracy.

In part (b)(i), the most successful candidates were the ones who used $3^x - x - 3 = 0$. Where other arrangements were used, part marks for substitution were often achieved but interpretations of the findings were often incomplete or wrong. In part (b)(ii), most candidates rearranged the equation correctly but several only obtained part marks through insufficient steps being used with the answer having been given. Part (b)(iii) was very well answered by candidates but marks were often lost for not writing the answer to two significant figures. Part (b)(iv) was very well answered.

Question 5

Part (a) was the least successful part of this question. A common incorrect answer was $\mathrm{f}(x) \geq 2$; other errors often involved poor notation. Many totally correct responses were also seen.

The majority of candidates answered part (b)(i) correctly. The main error seen was $\mathrm{fg}(x) = \dfrac{1}{\sqrt{x-2}}$. Part (b)(ii) was very well answered by the majority of candidates. Candidates who made errors in part (b)(i) were able to achieve at least the method mark.

Part (c) was very well answered by the majority of the candidates.

Question 6

Many candidates answered part (a) correctly and scored full marks but there were a significant number who gave a denominator of 10 in the second term of the answer after an otherwise correct approach. Some candidates tried to integrate x and differentiate e^{5x} which thereafter gave them no further credit.

In part (b)(i), most candidates obtained marks for finding $\dfrac{\mathrm{d}u}{\mathrm{d}x}$ but their attempts to obtain the given answer were often flawed. Part (b)(ii) was not done particularly well; many split the denominator, and did not see that it required the use of $\ln$ at all.

Question 7

Part (a)(i) was well answered by many candidates, who obtained full marks. Many often went on to obtain $\mathrm{e}^x(x^2 + 2x - 3)$ which helped them later in the question. Part (a)(ii) was also well answered but not quite as well as part (a)(i). Many candidates obtained partial credit for reasonable attempts at the product rule but often there was a term missing.

In part (b)(i), the removal of e^x proved to be a major challenge: a large number of candidates chose to take logs (incorrectly) and, although some were lucky in the way they had written out the next step and recovered marks, many generated unmanageable expressions. In part (b)(ii), many correct responses were seen.

Question 8

Part (a) was very well answered by the majority of candidates although errors of $\tan^2 x$ and $\ln(\sec x)$ were seen.

In part (b), the first step, the use of the quotient rule, was reasonably well done although the quotient rule was not always quoted correctly. Errors occurred where candidates had wrong signs for derivatives of $\sin x$ and $\cos x$ or where the functions in the numerator were reversed. Many candidates went on and used appropriate trigonometric identities to obtain the given answer.

Part (c) was not very well answered by most of the candidates. Many candidates obtained the correct expansion of $(\tan x + \cot x)^2$ but were then unable to handle the term $2 \tan x \cot x$. There were numerous flawed attempts using expressions such as $(\tan^2 x + 1) + (\cot^2 x - 1)$ equals the answer given.

In part (d), many candidates obtained the first method mark but went no further. Those who correctly integrated the expression often lost the final accuracy mark by working in degrees, with 57° being common.

Mark Ranges and Award of Grades

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