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Mathematics 6360

MPC3 Pure Core 3

Report on the Examination

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General

The overall impression was that the paper was accessible to the majority of the candidates with few very low marks being seen. Many candidates appeared to have been well prepared and were able to score high marks, although there were few papers in the 70's. The majority of candidates seemed to have managed their time well with few incomplete scripts seen. Carelessness was noticeable.

Many candidates made 'silly' slips or miscopied work. Many showed a lack of attention to the detail of the question, clearly knowing the maths but failing to provide answers in the particular way requested, resulting in some good performances that could and should have been even better.

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 for failing to multiply by the derivative of $(3x + 1)$ so answers of $5(3x+1)^4$ were not uncommon.

Part (b) was not as well answered as part (a) but many correct responses were seen. The main error was again to miss the factor of 3 and the very common incorrect answer was $1/(3x+1)$.

In part (c) most candidates used the product rule successfully but a number of candidates believed that the differential of a product was the product of the differentials.
Candidates who made errors in part (b) were able to recover and earn 2 marks. A very common incorrect response was to simply multiply the answers to parts (a) and (b) resulting in $45(3x+1)^3$
Another common error was to 'simplify' $\ln(3x+1)(3x+1)^4$ to obtain $\ln(3x+1)^5$

Question 2

In general this question was done well by candidates of all abilities. Part (a) was very well answered by the majority of candidates, although $\tan x = 1/3$ and $\sin x = 1/3$ were also seen. 1.23 was usually seen but the second result was often incorrect. There were very few cases of results given in degrees.

Most candidates used the correct identity part (b) in and were successful in answering this part of the question. The main error was candidates using $\tan^2 x = \sec^2 x + 1$ and then fudging the rest of the solution.

In part (c) most candidates attempted to factorise the result from part (b), although some used the quadratic formula. Those who factorised were usually correct, although solutions of -1/3 and 1 were not uncommon. For the final 3 answers many totally correct solutions were seen. Candidates with an incorrect solution in part (a) were able to recover here from follow through marks, but often candidates failed to obtain both marks since 0 or 6.18 often accompanied 3.14.

Question 3

Part (a) of this question was reasonably answered with most candidates obtaining the method mark for the product rule. Some candidates then lost the accuracy mark through incorrect evaluation of the constant associated with the derivative of $\cos 2x$; 2 and ½ were frequently seen.

Answers to part (b)(i), although frequently correct, were often badly set out with the function being equated to zero or x being changed to α at various points in the solution. Division of $\cos 2x$ by $\cos 2x$ often resulted in zero before going on to fudge the correct answer. Part (b)(ii) was usually well answered with correct evaluations of f(0.4) and f(0.5). Some candidates then lost marks by just saying α was 'between these two values' without stipulating 0.4 and 0.5. Part (b)(iii) was usually well done but there were many cases when the tan became removed from its $2x$ and $\frac{1}{2}x \tan^{-1} = x$ was often seen. Part (b)(iv) was generally well answered but marks were lost from the use of degrees and for not writing the answer to the required degree of accuracy.

Many fully correct answers and many answers which only lost the final accuracy mark were seen in part (c). Other answers which had the wrong coefficient associated with the $\sin 2x$ often got the method marks. There were candidates who started with $u = x$ and $v = \cos\ 2x$ or started with $\frac{\mathbf{d}v}{\mathbf{d}x} = x$ and obtained a more difficult integral.

Question 4

Part(a) was fairly well answered but, for many candidates, putting $x = \square$ and $x \geq 0$ was also common.

Part (b)(i) was very well answered. Most candidates at least obtained the 2 method marks but several lost the accuracy mark for an incorrect sign in the numerator. A few candidates tried using a flow chart but these were generally unsuccessful. Part (b)(ii) was answered well by the majority of candidates. Common errors were responses of 0 or $2/3$.

Part (c) was not very well answered by the majority of candidates, although most gained part marks. Many candidates only gave the result from the positive square root of 9 or $1/9$. Those candidates who formed a quadratic and solved it were far more successful in obtaining both results for the final accuracy mark.

Question 5

Part (a)(i) was probably the worst answered question on the paper. Most scored B0B1because the curvature to the left of $(a, 0)$ was wrong. Part (a)(ii) was similar to part (a)(i) but this time it was usually B1B0 with the shape being correct but the coordinates of the intercepts on the axes were often incorrect.

In part (b) many fully correct answers were seen and most candidates earned partial credit. Mistakes usually occurred where candidates started with the translation and gave the combined vector. Where candidates started with the stretch they were far more successful.

Part (c) was very well answered with many candidates earning full marks.

Question 6

Most candidates produced the correct derivative in part (a). The main error was the omission of the 3. Substitution of $x = \ln 2$ was usually correct although there were several cases of $e^{3\ln 2} = 6$.

Part (b) was generally very well answered. The majority of candidates attempted the mid-ordinate rule with many fully correct responses seen. Errors occurred with working with 3 s.f. and writing the final answer to an inappropriate degree of accuracy.

Part (c) was done very well up until the last step where a very large number of candidates thought that $2 - 1/3 = -5/3$ and failed to gain the final mark.

Question 7

Part (a) was very well answered with most candidates gaining all 3 marks but it was not uncommon to see an incorrect quotient formula used (usually the wrong order in the numerator, but sometimes the wrong denominator)

Part (b) was reasonably well answered. However a number of candidates tried to tackle this question by squaring, generally without success.

There were very few successful attempts seen in part (c). Most candidates failed to provide $\frac{dx}{d\theta}$ at all. Many of those who did make an attempt chose to try a different substitution of their own, either immediately or subsequently.

Mark Ranges and Award of Grades

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