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General Certificate of Education

Mathematics 6360

MPC3 Pure Core 3

Report on the Examination

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General

The paper was accessible to the majority of candidates with few very low marks being seen. Many candidates appeared to have been well prepared, being able to score high marks, although very few scored $70+$. There was little evidence of scripts where candidates had run out of time. The majority of candidates produced well presented scripts. Candidates at all levels of ability were able to attempt all of the questions with none proving to be inaccessible.

Question 1

This question was well answered with many candidates gaining full marks. There were quite a few candidates who lost marks by answering to 3 decimal places instead of to 3 significant figures. Some candidates lost marks by using $1, 2, 3, 4, 5$ as the values of x, rather than 1.5 etc, but very few candidates chose alternative methods such as Simpson's rule or the trapezium rule.

Question 2

This question was well answered by the majority of candidates. Common incorrect answers involved the use of 3 rather than $\frac{1}{3}$ or naming the y-axis rather than the x-axis when referring to the stretch. The answer of "squash – scale factor 3 – (in the x-direction)" did occur on more occasions than had been expected. The word "transformation" was often used instead of "translation" and the vector for the translation was often described in words rather than stated as a vector.

Question 3

Parts (a), (b)(ii) and (c)(ii) proved to be beyond the capability of most candidates. Candidates with correct values tended to struggle with the appropriate notation. In part (c)(i) the majority of candidates found gf, with very few finding fg, however many candidates lost marks for trying unsuccessfully to simplify their answers. There was a poor response to the final part of the question, with -2 being rarely seen.

Question 4

In part (a), many candidates made a very good attempt at integration by parts, with full marks often being obtained. A major error was $\frac{\mathrm{d}v}{\mathrm{d}x} = \sin x$ leading to $v = \cos x$; however, candidates who had shown their components for using parts were still able to obtain half marks. The omission of $\mathrm{d}x$ was common.

In part (b), relatively few candidates were able to change the variable; many candidates were unable to handle the $\mathrm{d}x$ and could not write the integral in terms of u and $\mathrm{d}u$. Where the final answer was correct, candidates had omitted $\mathrm{d}u$ in their working, resulting in the loss of marks. However, well prepared candidates did produce fully correct solutions.

In part (c), many candidates answered this question correctly, although $\pi\int x^2\mathrm{d}x$ was common as was 2π instead of π. A significant number of candidates wrote $\int (y+9)\,\mathrm{d}y = \frac{y^2}{2} + 9x$.

Question 5

Parts (a) and (b) were very well answered with most candidates scoring full marks. Surprisingly, part (c) proved to be demanding. Many candidates only found 2 rather than 4 solutions and,

more alarmingly, candidates seemed to have a problem dealing with the $(\theta - 0.1)$ and often subtracted the 0.1, giving an answer of 0.63 rather than 0.83.

Question 6

In part (a)(i), many candidates were unable to produce a correctly expressed solution, despite dealing correctly with the differentiation. The main error was the omission of brackets around $8x+3$. Part (a)(ii) was well answered by the majority of candidates. Part (b)(i) was well answered by the majority of candidates, although a common error was $6y^2 + \frac{1}{x}$. Most candidates correctly substituted $y = 1$ and obtained 7, although 6 was a common evaluation; a substitution of $y = 2$ was also seen. Many candidates who obtained 7 then proceeded, incorrectly, to write $(y-1) = 7(x-2)$, although a few candidates correctly wrote "$(x-2) = 7(y-1)$". The significance of $\frac{\mathrm{d}x}{\mathrm{d}y}$ was rarely appreciated, with a significant number of candidates finding an incorrect gradient of $-\frac{1}{7}$, and confusing $\frac{\mathrm{d}x}{\mathrm{d}y}$ with the gradient of a normal.

Question 7

Parts (a) and (b) were usually well done, but in part (b), although many completely correct answers were seen, there were also many diagrams where part (a) had been translated 4 units along the x or y axis and W-shape diagrams were also popular. Dealing with the modulus in part (c) proved to be challenging, although there were many fully correct answers. Candidates appeared to be more successful with finding $x = \frac{4}{3}$ than $x = -4$. A surprising number of candidates followed $3x = 4$ by $x = \frac{3}{4}$. Those candidates who were successful in part (c) were usually successful in part (d) but correct values with incorrect inequality signs was a common error.

Question 8

Part (a) had a mixed response. Quite often answers were expressed as decimals and equally frequently in degrees, with $A = 180$ and $B = 90$ being common errors. Part (b) was a good source of marks for many candidates. Those candidates who correctly arranged the equation as $\cos^{-1} x - 3x - 1 = 0$ were usually successful in answering this question. Problems arose for candidates who tried to rearrange to other forms such as $x = \cos(3x+1)$, and then were unable to explain their results. Part (c) was usually very well answered, with most candidates receiving full marks.

Question 9

Part (a)(i) was well answered, with the main error being $\int -\mathrm{e}^x \mathrm{d}x = -2\mathrm{e}^{2x}$. In part (a)(ii) the answer was given. Frequently candidates tried to 'fudge' their solutions to arrive at the correct result, with a common error being $4\ln 2 - 2 - \frac{1}{2} = 4\ln 2 - \frac{3}{2}$, the given answer. Part (b)(i) was again well answered by the majority of candidates, although in part (b)(ii) the step from $2x = \ln 4$ to obtain $x = \ln 2$ was often unconvincing. Some candidates answered part (c) very well and gained full credit. The main error was using 8 or -8 as the gradient of the normal, however many candidates earned at least partial marks.

Although correct answers were seen in part (d), they were not common. Many candidates earned the method mark by the substitution of $x = 0$ and some went on to find the area of the triangle. The final mark was often lost through a failure to realise that the area was positive.

Mark Ranges and Award of Grades

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