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General Certificate of Education

Mathematics 6360

MPC2 Pure Core 2

Report on the Examination

2010 Examination – January series

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General

Presentation of work was again reported as being very good. Most candidates answered the questions in numerical order and completed their solution to a question at a first attempt. Candidates found the paper more challenging than last January; in particular the final question on solving trigonometric equations was answered poorly. It was also disappointing to see some candidates answering questions different from those asked; for example, in question 1 part (b), the area rather than the perimeter of the shaded region was found, and, in question 5 part (c), the equation of the tangent was found instead of that of the normal.

Teachers may wish to emphasise the following points to their students in preparation for future examinations in this unit:

- Candidates should continue to be encouraged to read the questions carefully and to answer what has been asked; for example a diagram with a region shaded does not always imply that the question will be asking for the area of that shaded region.

- Logarithms and trigonometric functions do not obey basic algebraic manipulation rules, for example, $\log(n-4) \neq \log n - \log 4$ and $\tan(x+52) \neq \tan x + \tan 52$.

Question 1

Most candidates quoted the general formulae for the area of a sector and the arc length, showed the correct substitution and evaluated each correctly to score full marks for part (a)(i) and part (a)(ii). A significant minority of candidates, far more than anticipated, found the area of the shaded region for which no credit was awarded. Those candidates who attempted to find the perimeter almost always gained the mark for stating $PB = 5\text{cm}$.

The majority also realised that the cosine rule was required, although some incorrectly assumed that OPA was a right-angle and applied Pythagoras' Theorem to find the wrong value for the length of AP. The usual errors in applying the cosine rule were seen: wrong order of evaluation and calculators set in the wrong mode. However, for many of the candidates, this question turned out to be their best answered on the paper.

Question 2

Most candidates answered parts (a) and (b) correctly; the most common incorrect values for k in part (a) were either $5\frac{1}{2}$ or $\frac{1}{5}$, and in part (b) it was disappointing to see 4 being integrated as $\frac{4^2}{2}$. The final part of the question was generally answered very badly with the incorrect answer, $y = 3x$, the equation of a line, seemingly appearing as often, if not more so, than the correct equation of the curve.

Question 3

Many candidates obtained the correct values for x in parts (a)(i) and (a)(ii). The more able candidates often presented a full correct solution when solving the logarithmic equation in part (b) but a common error, seen in solutions from less able candidates, was to assume that $\log(n-4) = \log n - \log 4$, which frequently resulted in a single value for n even though the question asked for the possible values of n.

Question 4

It was pleasing to see a very high proportion of candidates showing sufficient detail in their solutions to completely justify their obtaining of the printed result in part (a). Most candidates used the correct general formula for the nth term of an arithmetic series to find u_{16} and u_{21} in part (b), but it was not uncommon to see the multiplier 2 being applied to u_{21} instead of u_{16}. The final part of the question was answered poorly with many candidates either solving $u_k = 0$ instead of $S_k = 0$, or looking in the formulae booklet and writing $\frac{k}{2}(k+1) = 0$.

Question 5

There were many correct answers for the derivative in part (a) although the incorrect answer $-3x^{-2} + 48$ was not a rarity. Candidates who wrote down $y = x^{-3} + 48x$ before differentiating generally scored more marks than those who just stated an answer. Many candidates appreciated the need to put $\frac{dy}{dx} = 0$ in part (b) but poor algebraic manipulation or a failure to include '±' frequently resulted in low marks for this part of the question.

Even those who obtained the correct coordinates of the stationary points did not always appreciate that the required tangents had equations $y = \pm 32$. Although the marks for finding the equation of the normal in part (c) were generally better than for the work in part (b), it was surprising to see a significant minority giving the equation of the tangent at the given point.

Question 6

Candidates' sketches generally displayed a thorough understanding of the graph of $y = 2^x$.
In part (b)(i) the trapezium rule was frequently applied correctly and a smaller proportion of candidates than normal failed to give their final answer to the stated degree of accuracy. Part (b)(ii) was almost always answered correctly. In part (c), the question asked for a description of **a** geometrical transformation. Although answers which gave two separate translations were condoned, the penalty for descriptions which involved two different transformations, for example stretch and translation, was severe. However many correct descriptions were presented, which indicates the continued improvement in candidates' performance on this topic. Part (d), as expected, proved to be demanding. The common wrong approach is illustrated by '$\log y = \log 2^{x+k} + \log 3$'. Better candidates applied the correct substitution and manipulation to reach $2^k = 5$, but a significant minority of these candidates, after taking logs and using the log law, left their answer in the form $k = \frac{\log 5}{\log 2}$.

Question 7

Although the usual errors, which resulted in the wrong answers $1 + 7x + 21x^2 + 35x^3$ and $1 + 14x + 42x^2 + 70x^3$, were seen, there was some indication of an improvement in candidates' ability to apply the binomial expansion correctly. In part (b), the required method was generally well understood by average and more able candidates, but solutions with a correct coefficient of x^3 were a rarity, as the expansion of the squared term $\left(1 - \frac{1}{2}x\right)^2$ was frequently incorrect.

Question 8

This trigonometry question was the worst answered question on the paper. A common error in part (a) was to either use the wrong identity $\tan(x + 52) = \tan x + \tan 52$ or to solve $x + 52 = \tan^{-1} 22$. Although many candidates scored a mark in part (b)(i) for recalling the identity $\tan\theta = \frac{\sin\theta}{\cos\theta}$, a significant minority of these candidates could not recall or apply the identity $\sin^2\theta = 1 - \cos^2\theta$ correctly.

In part (b)(ii), many candidates applied a correct method to solve the quadratic equation but a significant number of candidates gave two values for $\cos q$ as their final answer, even though the question asked for 'the value'. It was disappointing to see candidates attempting part (b)(iii), which started with the word 'Hence', without linking their solution to previous work. Although some excellent solutions to this final part were seen, the majority of candidates failed to make any real progress.

Mark Ranges and Award of Grades

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