Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

January 2022

Pearson Edexcel International GCSE

In Further Pure Mathematics (4PM1)

Paper 01R

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Question 1

This question was answered well by a majority of candidates.

Where candidates lost marks, they often successfully drew the required lines, but identified the incorrect region or didn't appreciate the need to draw the lines $y = 3$ and $x = 1$ in part (b) of the question.

Question 2

Several candidates were able to successfully answer both parts of the question, gaining full marks. Failure to gain marks in part (a) generally arose from an unawareness of the general form of the nth term.

In part (b), the main reasons for loss of marks were using the incorrect first term or the incorrect value of n in the respective formulas.

Question 3

Part (a) – a surprising number of candidates failed to appreciate the need to find the midpoint of AB, limiting further progress in the question. Most candidates were able to find the gradient of line l and of those who successfully found the midpoint of AB, full marks were often gained.

Part (b) – many candidates successfully employed a few different methods to find the required area, including the use of Heron's Formula. Of those who successfully found the midpoint of AB, most progressed to gain full marks in this part of the question.

Question 4

Part (a) – most candidates were able to successfully identify the correct expression for the area of the sector and some, the correct expression for the area of the triangle. Some candidates were able to go on to form the equation required to make further progress, but this proved difficult for quite a few candidates. The most common reasons for not gaining full marks were not using the correct expression for the area of a triangle and poor manipulation to find the value of *r*.

Part (b) – a significant number of candidates presented a concise, well-presented solution, but a significant minority did not correctly identify the lengths required to find the perimeter.

Question 5

A majority of candidates were able to attempt part (a). Some candidates lost a mark by presenting ax^2 and ax^3 in their expansion and others by failing to expand $(ax)^2$ and $(ax)^3$ to obtain the required form demanded by the question.

Almost all candidates were able to use their coefficients to make some progress in part (b) to find *a* and *n* and it was rare to see a candidate who did not gain at least the method mark available for part (c). Incorrect presentation of the final answer in part (a) was the main reason marks were lost in parts (b) and (c).

Question 6

Part (a) – almost all candidates realised they needed to show at least one pair of vectors were parallel and equal and gained at least the first two marks. Many were able to gain full marks in this part of the question.

Where candidates lost marks, they often presented a solution which after finding 2 parallel vectors, only compared equal lengths. A small number of solutions found the required vector but then did not successfully compare it with one of the given vectors to establish it was parallel and equal. Candidates would be well advised to always write the vector paths, as given in the mark scheme.

Part (b) – was generally attempted by most candidates, with most candidates being able to find the vector $\overrightarrow{QS}$. There were a surprising minority of candidates who, having found a relevant vector, didn't successfully find and divide by its magnitude to give the unit vector.

Part (c) – was generally well answered.

Question 7

Part (a) – many candidates were able to make progress with this part of the question with a clearly presented and concise solution.

Part (b) – most candidates were able to successfully differentiate and solve the required equation to identify the correct value of x. A relatively small number of these failed to reject the negative solution or didn't find the second derivative to show this was a minimum point.

Part (c) – was almost universally well answered.

Question 8

Responses to this question were very varied.

Some candidates made progress but failed to evaluate fully the y coordinate required, leaving their answer as $2\pi^2 - \sin\pi$ and leaving $\cos\pi$ in their evaluation of the gradient. This then led to problems in simplification and limited further progress with the question.

In general, many were able to successfully differentiate the equation given.

Candidates who found the required coordinates for point A and the required gradient made good progress in the rearrangement required to show the given result.

Question 9

Almost all candidates were able to successfully gain some marks in parts (a) and (b) of the question. The small number of candidates who did not gain full marks in these parts of the question had usually ignored the demand of the question to give answers to 2 decimal places or did not use the scale correctly on the *y* axis. A significant proportion of candidates plotted the point (-2, -0.57) incorrectly.

The most able candidates were able to successfully attempt part c, the most common outcome being to gain 4 or 5 marks, with very few gaining just the initial method marks. Candidates generally employed the first method given by the mark scheme. A small number of candidates successfully identified and drew the line, but then failed to write down the root of the equation.

<u>Question 10</u>

Part (a) – was well answered.

Part (b) – was answered well by a large number of candidates. Candidates who lost marks generally missed out steps required in a question where the demand was to “show that” or tried to work backwards from the given result.

Part (c) – most candidates were able to gain the first mark, successfully substituting in the required identities and many were then able to make good progress to show the given result. Where marks were lost, this was usually with the expansion of the second bracket, with some poorly laid out algebra causing some errors.

Part (d) – a surprising number of candidates didn’t realise they needed to find a quadratic factor and demonstrate this led to an equation with no solutions. Of those that realised this, often full marks were gained.

<u>Question 11</u>

Part (a) – most candidates were able to answer part (i) correctly and many were able to answer part (ii). Where candidates did not score full marks for part (ii), they generally progressed successfully to $e^{2x} = 9$ but, given this was a "show that" question, there was then insufficient working to show the given result.

Part (b) – a large proportion of candidates were able to correctly state the required form of the area, though a reasonable number then made an error in either multiplying out the brackets or tried to integrate without doing this. The most common error when multiplying out the brackets was $e^{2x} \times e^{2x} \Rightarrow e^{4x^2}$, but there was scope within the scheme for marks to be still awarded for integration and substitution of limits beyond this. Some candidates could have gained the final method mark by showing completely the substitution of limits into their changed function and, not omitting the substitution of 0.

Those candidates who got the correctly expanded form of the expression to be integrated, generally then integrated successfully. Occasionally there were errors in differentiating rather than integrating and in such as e^{4x} being integrated to the form e^{5x}.

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