Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

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Pearson Edexcel GCE

In AS Further Mathematics (8FM0)

Paper 01 Core Pure Mathematics

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Question 1

Overall that question was very well done by the majority of candidates.

Part (a)

(i) A small proportion of candidates thought that it was a reflection (in $y = -x$) rather than a rotation. Candidates gave all the required information, angle, direction and centre of rotation

(ii) A small proportion of candidates thought that it was an enlargement instead of a stretch. Candidates were bale ti identify the scale factor and direction of the stretch.

Part (b) Whist most of the candidates found the matrix **R** by multiplying the matrices **P** and **Q** in the correct order, quite a few had the incorrect order.

Part (c)

(i) All of the candidates were able to correctly find the determinant of their matrix **R**

(ii) Candidates demonstrated some understanding that the value of the determinant gave a scale factor but did not mention that it was the scale factor of the area

Question 2

Very well done by the majority of candidates. The most common and successfully approach was using $w = \frac{x+2}{3}$, with the final mark lost on a few occasions due to a numerical slip.

It was good to see that not many candidates used the sum, pair sum and product of roots approach.

Question 3

Part (a)

Candidates knew how to tackle this part of the question. They multiplied out the brackets and then used correctly the standard summation results, including $\sum_{r=1}^{n} 4 = 4n$. They factorised out $\frac{1}{6}n$ and the majority scored full marks. There were a few numerical slips

Part (b)

Again, candidates knew how to tackle this part, setting their answer to part (a) equal to $94k^2$ and then rearranging to form and solve their cubic/quadratic equation.

Candidates knew that the value of *k* needed to be a positive integer and selected this answer. Candidates who made a numerical slip rounded their decimal answer to the nearest integer

Question 4

Part (a) The majority of candidates knew how to multiply the two matrices with the occasional sign/bracket slip

Part (b)

(i) Candidates gave the correct matrix **MN**, with some good use of a calculator.

(ii) The correct inverse matrix was found by the majority of candidates, again a few numerical/sign slips

Part (c) Candidates knew to multiply the inverse matrix by $\begin{pmatrix} 2 \\ 3 \\ -1 \end{pmatrix}$ and used their calculator to do so successfully.

Part (d) the most poorly done part of this question. Most candidates knew that it was a point of intersection but some did not say that the equations represent planes. Candidates needed to say that the **planes** meet at a single point.

Question 5

Part (a) the majority of candidates stated the correct values for *a* and *d*. Some candidates had the incorrect sign for the values of *b* and *c* forgetting that it is $\left|z-(\alpha+\beta \mathrm{i})\right|$ where centre coordinate (α, β)

Part (b) was not done very well by the majority of candidates. A few score one mark for finding the area between the two circles. Even fewer recognised that the critical line for $|z-\mathrm{i}| \leq |z-3\mathrm{i}|$ was $y = 2$. Only two candidates recognised that they need to find the area of the sector minus area of the triangle. This appeared to be the demanding part of this question.

Question 6

Part (a) the majority of candidates did not know how to find the normal vector for the plane. Candidates who were aware of the cross product had the best success.

Part (b) For candidates who did attempt this part they used the dot product with $\begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$ and not a vector parallel to the vector **k**

Part (c) For candidates who did attempt this part they used the shortest distance formula

Part (d) It was pleasing that candidates who struggles with this question still had a go at this part. Candidates are reminded that when asked to give a limitation of a model that they need to say what the real situation has that the model does not take into account e.g. ‘the mineral layer will have depth’ not ‘it has no variation’. In this question comment on the mineral layer and what difference it will have compared to the model the plane.

Question 7

Part (a)

(i) All the candidates we able to correctly write down the complex conjugate

(ii) The majority of candidates were able to successfully explain that complex roots appear as conjugate pairs and therefore as α is real so δ must also be real.

Part (b) was done very well by most of the candidates, using the sum of the roots equals 6 to find the missing root.

Part (c) Again this part was done well by the majority of candidates. It was about half and half with candidates choosing to use the pair sum, triple sum and product of roots approach or writing as factors and multiplying out the brackets. Both approaches were similarly successful with the occasion sign/numerical slip

Part (d) this part was not done very well. Many left it blank, a few double the roots instead of dividing by – 2

Question 8

Part (a) Candidates score the first two marks for showing that it is true for $n = 1$ and assuming true for $n = k$. Finding the result when $n = k + 1$ proved more difficult, candidates are reminded they need to use the result for $n = k$ and add the $(k + 1)$th term, so

$$\sum_{r=1}^{k+1} r(r+1)(2r+1) = \frac{1}{2}k(k+1)^2(k+2) + (k+1)(k+2)(2k+3)$$

Candidates who correctly identified this often went on to find a simplified expression.

Candidates are reminded that they need to demonstrate that the result is true of $n = k + 1$, when they have their result make it clear for example

$\sum_{r=1}^{k+1} r(r+1)(2r+1) = \frac{1}{2}(k+1)(\{k+1\}+1)^2(\{k+1\}+2)$ not leaving it as

$$\frac{1}{2}(k+1)(k+2)^2(k+3)$$

Alternatively substitute $n = k + 1$ into the $\sum_{r=1}^{n} r(r+1)(2r+1) = \frac{1}{2}n(n+1)^2(n+2)$ as show that their result is the same and draws a conclusion.

Candidates are getting better at writing the correct overall conclusion.

Part (b) not done very well at all, with many not knowing how to start it

$$\sum_{r=n}^{2n} r(r+1)(2r+1) = \frac{1}{2}(2n)(2n+1)^2(2n+2) - \frac{1}{2}(n-1)n^2(n+1)$$

Question 9

Part (a) All the candidates used the coordinate (5, 15) to find the value of a

Part (b) Some candidates did not realise that the volume was generated by rotating the curves around the y-axis and so the volume formula $\pi\int x^2 \, \mathrm{d}y$ was required not $\pi\int y^2 \, \mathrm{d}x$. Candidates who used the correct volume formula had mixture fortune with a few just finding the volume from one curve. The correct y limits were generally used.

Part (c) Like with question 6p part (d) candidates generally had a go at this part. The most common limitation was that the candle would not be smooth or there would be a whole for the wick.

Part (d) Candidates are reminded that they do need to draw a conclusion about the model when asked to evaluate. Is the model a good model?

Overall there were some questions were candidates scored well, for example 1, 2, 3, 4 and 7 and others which they found more demanding for example 5, 6 and 9.