Examiner's Report
Principal Examiner Feedback

Summer 2018

Pearson Edexcel GCE
In Further Pure Mathematics FP1 (6667/01)

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Introduction

Generally the paper proved to be very accessible with almost all students able to successfully gain the first few marks on each question. The questions enabled students in the lower ability range to show what they could do and it was rare that students felt unable to access at least some part of the paper. The most challenging questions and a common cause of arithmetic and/ or algebraic errors were question 6, question 8 and question 9.

Question 1

This was very well answered by the majority of students with many gaining full marks. Omitting $z = 1$ as a root or making an error in the solution of the quadratic were the most commonly seen errors. Use of the formula was more successful than completing the square, where it was common to see division by 2 to give $z^2 - z + \frac{13}{2} = 0$, followed by $(z - 1)^2$ rather than $(z - \frac{1}{2})^2$.

Question 2

Part (a) and part (b) were very well answered with many students gaining all of the first 7 marks. Both fractions and decimals were used successfully in calculations, however, very occasionally the first accuracy mark was lost for not mentioning 'sign change' or drawing a conclusion. Part (c) was not so well done. The method of linear interpolation was well known but the negative values created difficulty for some.

Question 3

Part (i) was well answered. The methods were well known, and just occasional arithmetic errors were seen in part (b). In part (ii)(a) many students drew a diagram and most recognised the rotation, but occasionally either the direction or the centre was missing. In part (b) most common errors were to state that since C^4 was the identity then C^{39} was $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ or to use $1^{39} = 1$ and $(-1)^{39} = -1$ so $C^{39} = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$

Question 4

Occasionally in part (a) the 8 was not changed when the factor $\frac{1}{3}$ or $\frac{1}{6}$ was taken out. This could still lead to an expression of the correct form, namely $\frac{n(n+3)(n-3)}{3}$. Otherwise part (a) was a good source of marks. In part (b) most students selected just the positive value, but unfortunately a few gave all three values. Attempts at part (c) were largely successful with almost all students substituting 17 and 2 into the formulae. One or two reverted back to the three separate terms and some combined the result from part (a) with the sum of cubes formula before substituting.

Question 5
Part (a) was almost always fully correct. Part (b) was also well answered with most using the method in the main scheme. Those who did not cancel *c* sometimes made an error in either factorising or using the formula on the quadratic. Those students who tried an alternative method were less successful in completing correctly.

Question 6
Occasional sign errors gave the answer 20 for some in part (a), but this was usually correct. The method in part (b) was often correct, but the use of (k-1) or (1-k) proved a stumbling block for a many. Those who did use one or both used a variety of strategies to obtain the two correct answers. Some used both (k+1) and (k-1), others used $|k-1|$ and some used ±18. Some just used (k-1) to give the answer $k = \frac{11}{2}$ and then deduced the negative value of k, often with the help of a diagram. Although quite a few students found the matrix **T'**, they did not then use it to complete the solution.

Question 7
Part (a) was usually correct with both methods commonly seen. Unfortunately, some students used calculus unnecessarily. In part (b) many students drew a diagram and a variety of methods were seen. The most successful and concise involved finding the gradient of *SP*.

Question 8
The first two marks were awarded often. There were many fully correct proofs usually showing that $f(k+1) = 2f(k) + 7(3^{2k+1})$ although a few students did not make f(k+1) the subject. It was quite common to see f(k) written as 7A for example, leading to $f(k+1) = 7(2A + 3^{2k+1})$. Those who got as far as $f(k+1) – f(k) = 4(2^k) + 24(3^{2k})$ often stopped, not knowing how to get the multiple of 7. The concluding statement was almost always included to complete the proof.

Question 9
All parts of this question presented difficulties to some students. They knew what to do in part (i)(a), but made algebraic errors in manipulating to make w the subject especially in combining fractions. Unfortunately (3+i)(3-i) = 4 was seen a few times. In part(i)(b) quite a few students seemed to work with arg $w = \frac{\pi}{4}$ rather than $\frac{\pi}{2}$ and equated the real and imaginary parts.
Part (ii) was the most challenging question on the paper and a discriminator. Those who realised that they needed to replace z by x +iy or a+ib did go on to give a completely correct solution, but many attempts to take the conjugate were incorrect and some ignored the conjugate altogether. Also, many students tried to solve for z which usually gained no credit. A number of students attempted to multiply (z + 1 - 2i)(z +1 +2i).

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