Examiners' Report

Summer 2015

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

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Mathematics Unit Further Pure Mathematics 1

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General Introduction

The paper was very accessible to all students, with methods well known and accurately executed. The work was generally well set out so that it was not difficult to follow the working. There were very many completely correct solutions to the first 5 questions, but questions 6, 7 and 8 proved more demanding. However, students were typically able to start and make some progress on all questions.

Report on individual questions

Question 1

Almost all students recognised that (x-5) was a factor and the majority successfully found the correct quadratic factor, usually by performing algebraic division. Most students were confident at solving the resulting quadratic with complex roots, and when earlier mistakes had been made, students appeared to be aware that solutions appeared as a complex conjugate pair. Very few students ended with only real solutions.

Question 2

Interval bisection in part (a) was generally well understood, with most students arriving at the correct answer. A few only bisected the interval once, while several continued until the function values (rather than input values) had an interval of less than 0.25.
The method of linear interpolation in part (b) was generally well attempted. Some students used negative signs and many made several attempts as they realised that their answer did not seem reasonable. Some students used the line between two points, usually with less success. Some errors were made where students used the interval found in part (a) to interpolate instead of the interval given in the question.

Question 3

Most students used the general formulae successfully in part (a). Many students multiplied out all the brackets, only removing a factor at the end of their working and this was usually a successful approach. Of those removing a factor of n/6 or n/3 at the start, the biggest problem was carelessness in their working, leading to unnecessary slips.
Most students were fully successful in part (b), although those who had been unable to complete part (a) did not often attempt it. Common errors included inaccurate multiplying out of brackets, not using the formula shown in part (a), or calculating f(n+1) - f(n) or other incorrect combinations.

Question 4

Almost all students made a confident attempt at part (a). However, in part (b) a significant number of students neglected to calculate the modulus, indicating that they did not read the question properly. When the modulus was used it was usually found correctly. Almost all students recognised the use of the tan function to calculate the argument. However, many students did not make use of an argand diagram or their knowledge of complex numbers to use the correct sign for the argument, leaving their answer as $\pi/3$. The Argand diagram in part (c) was frequently completed successfully, although not all students could place z_2 in the correct quadrant, even if they had correctly calculated part (a).

Question 5

Most students found part (a) accessible, using a variety of different approaches. The given equation was generally reached successfully without errors. Most students successfully obtained an equation in one variable in part (b) and worked their solution through to find the correct coordinate. Errors appeared to be mostly careless, rather than brought about by poor understanding of the question.

Question 6

Most students were able to demonstrate their understanding of the concept of proof by induction. A large number of students produced clear, well set out solutions, with a correct conclusion.

Almost all students started by attempting to check for n=1, but often neglected to state that they had shown it to be true next to their working at this stage. Most students correctly assumed the statement for $n=k$ and knew they had to do something for $n=k+1$, but not all were sure how to proceed.

Matrix multiplication in part (i) was generally well executed, although many students struggled to rearrange their answer to resemble what they were trying to prove. Some missed out an intermediate stage altogether.

Students who took $(2k+1)$ out as a factor at the beginning were generally successful. More students, however, multiplied everything out and then took $(k+1)$ out as a factor. Some students arrived at the expression with 3 linear factors and then struggled to complete the proof. Very few students successfully started at both ends arriving at the correct cubic in the middle.

Question 7

Typically part (i) was completely correct. Most students successfully found the inverse in part (ii)(a). Where marks were lost, it was usually because the elements of the matrix were not changed according to the correct rules.

Those students who post multiplied their inverse by a 2 by 3 matrix in part (ii)(b) were generally successful, although a few forgot the factor of 1/45. Some students attempted to pre-multiply their inverse by a matrix. Some students used simultaneous equations, with varying degrees of success.

Students who had completed part (b) successfully often completed part (ii)(c) successfully too. Some good attempts were also made by students with the wrong coordinates from part (b). Many students did not attempt this part because they had struggled with earlier parts of the question. Some students could not successfully calculate the area of *T*, some did not use the area of *T'* and some did not divide it by 45.

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Question 8

Most students completed part (a) successfully, although many had troubles dealing with polynomial expressions underneath a square root. Many errors were made by students incorrectly using the length formula (i.e. 6p^2 instead of 36p^2). Those students using the directrix were seldom explicit enough in their proof.

Most students made a good attempt at part (b) of the question, reaching correct equations for the 2 tangents. Problems included incorrect differentiation and incorrect substitution. Many students then struggled to eliminate one of the variables, but of those that did manage it, the correct answer was usually reached.

Many successfully attempted to calculate SR^2 in part (c), even those with incorrect coordinates from part (b). Several students tried to calculate SQ (and even sometimes SP) from scratch, usually without success. Some students did manage to prove the equality, but many gave up. Often, marks were lost when the student failed to write a concluding statement.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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