Examiners' Report/
Principal Examiner Feedback

January 2013

International GCSE
Further Pure Maths
Paper 1 (4PM0/01)

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January 2013
Publications Code UG034502

International GCSE Further Pure Maths
Paper 4PM0 01

Candidates found paper 1 more challenging than paper 2. The responses for question 1 of paper 2 suggest that this topic presents difficulties for many candidates. It is important to remember that when the range for answers for angles includes π, the answers are required to be in radians. Some candidates did not abide by rounding instructions given in questions, and others used rounded answers in subsequent calculations which led to inaccurate final answers.

It is good practice to quote formulae before using them. In almost all cases, a correct formula with values then substituted for the variables can gain the method mark even if an error is made on substitution. Without the general formula on the page, an error on substitution means the method mark is lost and this can have serious consequences for the following work.

Some candidates have calculators which can solve quadratic equations simply by entering the coefficients in the correct manner. Whilst this is generally an acceptable way to solve an equation which is correct, it is not advisable in an examination as there is no supporting working to be shown. If the final answers are not correct, then without any evidence from supporting working, any available method marks cannot be awarded.

There were cases of candidates who needed extra space for a question using surplus space intended for a different question and not clearly indicating this had been done. In such cases, an extra sheet of paper should be requested instead.

Question 1

In part (a), many candidates had the right idea and put the lines in the correct place on the coordinate axes. However, a number of candidates had failed to read the instruction that points of intersection should be marked on the axes; many did not mark 4/3, and quite a few did not mark the (o,8) on the y axis, presumably assuming that writing y = 8 was sufficient for the mark.

In part (b), most candidates again did not read the question carefully and missed the constraint $x \geq 0$, and thus the final mark eluded all but a few candidates.

Question 2

'A' grade candidates generally understood that the discriminant had to be greater than zero, and gained the first two marks in this question. Many of the less able candidates put ≤ or < 0 thus losing the first M and A marks. Although there were candidates who correctly specified $b^2 - 4ac > 0$, and went on to find the two critical values and understanding that the region was open, they did not write the final inequality correctly by omitting the "AND", thereby losing the final mark.

Question 3

A good majority of correct responses were seen in part (a), with many being able to complete the square with a non-unity coefficient of x^2. A few candidates compared coefficients, also successfully.

Part (b) was answered well with some candidates differentiating f(x) to find the minimum value of x rather than using their result from (a), and subsequently found 1/f(x) correctly. A few candidates made extra work for themselves by differentiating 1/f(x) using chain or even quotient rule, but these attempts were generally unsuccessful.

Question 4

In part (a), the vast majority of candidates opted to convert (a) and (b) into a more familiar form by finding 'a' and 'd' for 40 terms. This was very successful in (a), but less so in (b) where some candidates used n = 50, thus losing both marks.

Part (c) proved to be straightforward for candidates, and there were many completely correct responses. A few candidates lost marks by disregarding the irrelevant result. There was also evidence that some candidates had used a graphical calculator to solve the quadratic equation.

There were many responses in this question earning full marks.

Question 5

This question proved to be challenging for most candidates. Many candidates did not work in radians when using calculus, and thus lost marks.

In part (a), candidates generally realised that when the particle is at rest then v = 0, and went on to find a value for t of 45°.

All but a few of the most able candidates went on to use the value of 45° in part (b) rather than establishing that dv/dt is at a maximum when sin2t = 1, and then finding that $t = \frac{\pi}{4}$. Many recognised that acceleration was dv/dt and gained an M mark, but many responses only scored 1/3 in this part of the question.

In part (c), many candidates realised that $d = \int v$, and integrated correctly. However, few candidates found the constant of integration c, and even fewer used it to find the correct distance of 4.5 metres.

Very few candidates gained full marks in this question.

Question 6

Candidates demonstrated knowledge of the Sine rule and Cosine rule. However, there were a number of incorrect approaches to this question. Some candidates thought that a triangle had two angles of 128.5° or 100.6°

The angles for the whole question were established in part (a), and some correctly found the required 77.0°

Parts (b) and (c), however, proved to be more challenging for candidates

Question 7

This question proved to be accessible to candidates. Responses in part (a) were largely correct, with most finding $\sqrt{5}$, even if they subsequently added 2.24

In part (b), candidates could have achieved the answer using a quick sketch rather than half a page of calculations.

There were a variety of approaches to part (c) but many candidates achieved the correct solution.

Again, those who knew how to tackle this question, it was largely correct which led to (e) being again mostly correct.

This was an accessible question with many responses achieving full marks.

Question 8

Despite the question clearly specifying $0 \leq \theta \leq \pi$, many candidates chose to work in degrees, even if they later converted their answers to radians. There were however, still a pleasing number of perfect solutions to this question:

Most candidates knew what to in part (a), but marks were lost due to three different errors; some omitted a solution, some worked in degrees and lost the maximum two marks for the whole question here, and some did not round correctly.

Part (b) proved to be straightforward for the more able candidates. Some candidates, however, thought that tan (A+B) = tan A + tan B.

In part (c), the majority of candidates made the correct substitution. Slightly fewer candidates solved the resulting 3TQ, but those who did then found the final answer. Even if it was in degrees, they had already paid the penalty in part (a) so achieved full marks.

Question 9

A generally well answered question. Most candidates answered part (a) of the question well.

In part (b), many candidates found d = 4, but the main error was to take S_s to be the second term leading to a value of d=9. A few candidates equated to $\frac{n}{2}(2a + (n-1)d$, expanded and equated coefficients and found 'a' and 'd' correctly this way.

Most knew what to do in part (c) even if they used an erroneous value for d, thus achieving the method mark.

Part (d) proved to be accessible to most candidates. A few candidates offered two solutions (9 and -2.5 both as possible answers) and thus lost the final mark.

Question 10

There were a good number of accurate solutions to this question gaining full, or most of the marks:

In part (a), nearly every candidate found the correct values for $\alpha + \beta$, and $\alpha\beta$ and many correctly achieved the value as $\frac{21}{4}$.

Dealing with the fourth power correctly in part (b) proved to be difficult for many candidates.

Part (c) was answered well, even though only the most able candidates managed to get the correct values for the sum and product. There were many good attempts at the algebra, and quite a few full marks seen here.

Question 11

This was answered well by only the most able candidates who found it a straightforward and fairly typical question of its type.

In part (a), examples of incorrect solutions were -2 and 6.

There were some convoluted attempts at finding p and q in part (b), either by expanding the brackets and comparing coefficients or by using factor theorem. There were also quite a few correct values, usually from the more efficient and concise attempts.

In part (c), the majority of candidates differentiated their function and substituted the value of 2, and went on to write down an equation of the line using a correct method, thereby gaining most of the marks here even if p and q were incorrect.

Many candidates obtained full marks for part (d), although their methods were fairly roundabout. Many put down (-2,0) for A (by inspection from the diagram) even if they had not achieved a value of 2 for r.

Part (e) of this question served as a good discriminator for candidates at the highest ability range. Successful attempts at the area were fairly equally divided between the two alternatives in the mark scheme, with errors being introduced with incorrect signs for the three parts required if using the second method. Some candidates were able to integrate correctly, but did not understand the concept of combining areas and used only f(x) and therefore were unable to score marks in this last part of the question.

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