



Level 2

Further Mathematics

8365/2

Report on the examination

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Summary

Overall performance compared to last year

The front half of this paper was more accessible than the June 2024 paper. There were many excellent responses including on some of the more challenging questions. Some students did not present their responses well, particularly on questions requiring algebraic proof and when they needed to 'show that' something was true. Students should make their fraction answers clear, especially when the denominator is algebraic. Use of the additional pages for working was common on question 17 and to a lesser degree on questions 18 and 20. The overall number of non-attempts was the lowest there has been on this paper.

Topics where students excelled

- Working out the position in a sequence
- calculating the area of part of a circle
- solving equations involving indices
- working out the n th term of a quadratic sequence
- changing the subject of a formula
- using Pythagoras' theorem algebraically.

Topics where students struggled

- Working out the range of possible values of n^2
- factorising involving $(x - 1)^8$
- using a second derivative to work out the nature of a turning point
- questions involving trigonometry of angles that are not acute.

Individual questions

Question 1

This question was very well answered.

Question 2

This question was very well answered.

The most common error was when attempting to work out the area of triangle COD with students either using an incorrect formula or having an incorrect value for OD.

Question 3

This question was well answered.

Some students stopped after working out $a = 4$ and others gave the gradient as 8 instead of -8 .

Question 4

Many students gave an answer involving n rather than n^2 while others gave a list of integers. Another common error was to only have one side of the inequality correct, usually $n^2 \leq 25$. $25 \leq n^2 \leq 25$ was seen quite often and this answer was not awarded any marks.

Question 5

This question was well answered although some students made errors when substituting $x = -1$ after differentiating. Others made errors when solving the correct linear equation. Some did not attempt differentiation and substituted $x = -1$ into the equation of the curve.

Question 6

This question was a good discriminator for this stage in the paper.

A majority of students were awarded full marks. Some of those who correctly worked out that C was (11, 6) gave $y = \frac{11}{6}x$ as their answer. Others tried to work out the equation of AB.

A common error was to have C as (13.5, 4.5) but many of these went on to give the correct follow through equation and were awarded one mark.

Question 7(a)

This question was very well answered.

Question 7(b)

This question was well answered. Some students used $\frac{7}{c}$ instead of $7 - c$ but the most common error was when rearranging the terms in a correct linear equation.

Question 8

Omission of brackets was the most common error, and students should take extra care with their working when asked for a proof. Having $27k - 9$ instead of $27k + 9$ was seen quite often. Most students who had correct working leading to $27k + 9$ showed sufficient further working to be awarded the final mark as well.

Question 9

A challenging question for many students, partly due to the unfamiliar nature of the question. Some students worked with equations in x and p and many of these did not go on to substitute 1 for x . Some used inequalities, presumably because there were inequalities in the domain of the function. A majority of students were awarded full marks with only a few not able to solve a correct linear equation in p .

Question 10

This question was very well answered.

Question 11(a)

This question was well answered. Students should ensure their answer is written unambiguously especially when the fraction has an algebraic denominator.

Question 11(b)

Many students did not use $(x - 1)^8$ as a factor. Many of those who did could not work out the other factor or did not simplify this factor.

Question 11(c)

This question was quite well answered and was a good discriminator. Common errors included dividing by 2 at the outset and leaving the answer in surd form.

Question 12(a)

This question was very well answered.

Question 12(b)

A small majority of students were awarded full marks. Part marks were mainly awarded for at least one correct point or for the matrix $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$

A significant number of students did not have any correct working.

Question 13

This question was well answered and most students who showed correct work after the first step went on to produce a fully correct response.

Question 14(a)

Most students who started by writing Pythagoras' theorem as $(3w + 2)^2 = (2w + 5)^2 + w^2$ subsequently showed enough correct working to be awarded both marks.

Mistakes were more likely when students attempted to expand straight away or wrote Pythagoras' theorem in a less standard way.

Question 14(b)

Some errors were made when factorising or using the quadratic formula. The other common error was to link an expression to an incorrect trigonometric ratio. Overall, the question was well answered.

Question 15(a)

This question was well answered. Most students substituted $x = 3$ into the given expression for the gradient and showed that it evaluated to zero.

Question 15(b)

This question was a good discriminator. The common error when attempting the second derivative was to write $-18x^{-3}$. A significant number of students did not attempt a second derivative. Most who substituted $x = 3$ into the second derivative evaluated correctly with only a few concluding that the nature of the point was a maximum.

Question 16

There were lots of different ways to tackle this problem. Some expressions were 'correct' but they were not linked to the appropriate angle. Brackets were often omitted when angle BCD was worked out using the sum of the opposite angles of a cyclic quadrilateral is 180° . Most correct equations came from equating the angle sum of triangle BCD to 180° . The question was a good discriminator.

Question 17

Although many students needed more than one attempt, overall, the question was well answered. Most students showed their working as instructed. Many different approaches were seen including some matrix methods. The majority of these had the method shown and were correct. The question was quite a good discriminator.

Question 18

The method or value for at least one of the appropriate lengths was correct for most students. A majority of students worked out all three lengths correctly but applying the cosine rule using these values proved more challenging. There were however many students who were awarded full marks.

Question 19

$gf(x)$ was correct more often than $f(2x)$. Common errors for $f(2x)$ included omitting brackets or working out $2f(x)$. Some students did not include the $+ 8$ when attempting $gf(x)$. Most students who equated two correct expressions solved correctly but some made a sign error.

Question 20

This question was quite a good discriminator. Some students did not attempt differentiation but those that did usually gave the correct expression. Errors were quite often made when working out the gradient of the perpendicular line and some thought the gradient of the normal was -4 .

Question 21(a)

A challenging question for many students, partly due to the unfamiliar nature of the question. Some who worked out that $\sin \theta$ was $-\frac{3}{5}$ gave -36.9 or 216.9 as the answer. Many students did a lot of work but were not awarded any marks.

Question 21(b)

Although a significant number of students worked out all four correct angles many only gave two of the correct ones. Others only worked out one correct angle or were not able to work out any and were not awarded any marks. The most common incorrect angles seen were 0° and 262.8° . Very few angles outside the given range were seen. This question had the most non-attempts on the paper.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.