Questions matter

Level 2 Certificate
Further Mathematics

8365/2 Paper 2 Calculator

Report on the Examination

8365
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Summary

Overall performance compared to last year

The paper was more accessible than last year with many very good attempts at some of the later questions. Some students struggled with the differentiation of terms with negative powers. The product rule for counting and the binomial expansion are challenging topics for a significant number of students. Many students presented their work clearly but there seemed to be an increase in the number of responses where this was not the case. In a number of questions students did not use brackets appropriately. Only question 12(b) had a significant number of non-attempts.

Topics where students excelled

- drawing a straight line from given information
- linear sequence problem
- matrix algebra
- area problem involving trigonometry
- expanding brackets and simplifying
- simplifying a single algebraic fraction.

Topics where students struggled

- solving a quadratic inequality
- working out a second derivative
- binomial expansion problem.

Individual questions

Question 1

Very well answered with the majority of lines drawn having the correct gradient. The most common error was to draw a line passing through (–1 , 1). Only a few lines were not the required length.

Question 2

This question was not well answered. Many simplified the inequality to, for example, $n^2 = 7.2,$ but did not continue to work out integer values. Another common error was to only give the positive integer values of 1 and 2. Some students did not include zero while others gave an inequality for their answer.

Question 3

Nearly all the students who attempted differentiation had at least one term correct. Some arithmetic errors were made when substituting $x = 2$ into their derivative and others made errors when rearranging to work out $k.$ A significant number only substituted into the given expression for y and did not score any marks.

Question 4

All the alternative methods were seen, and the question was very well answered. The most common error was made in alternative method 1. This was to omit brackets when subtracting $8n + 6$ from $42 - 3n.$ Some who correctly processed this subtraction gave $36 - 11n$ as their answer, forgetting to work out the 20th term of A.

Question 5

Part (a) was well answered. Some could not solve the equations correctly, with most errors being to make a mistake with a sign when working out d. A few could not multiply the matrices correctly with $-2c + 7c$ and $-10d + 35d$ being written.

Many realised the identity matrix was the answer to part (b) although some wrote all the elements as 1. Others thought the answer was $\begin{pmatrix} 5 & 2 \\ 1 & 4 \end{pmatrix}$

Question 6

Many students do not realise that the range for a quadratic function cannot always be worked out by using the smallest and largest x values in the domain. Most scored only one mark for 50
The question was a good discriminator with about a third of the students scoring both marks.

Question 7

Part (a) was well answered.

Part (b) was more challenging with just over a half of the students giving the correct answer. A common wrong answer was $(-3, 4)$ and some transposed the coordinates.

Question 8

This question was a good discriminator. The term $\frac{3}{4x^4}$ was often written as $12x^{-4}$ before an attempt at differentiation was made. Another common error was to add one to the negative power when differentiating. Nearly all gave an answer in the required form, but many only scored one mark for differentiating the first term correctly.

Question 9

Another good discriminator with quite a good spread of marks. Most successful attempts involved the product of four integers although some did equivalent work by using the sum of two products of four integers. Some did not include the condition that only multiples of 5 were needed while others did not count zero as an integer. A few misread the question and gave the answer 9795, the largest 4-digit integer that satisfied the criteria.

Question 10

A well answered question. The first and last statements were incorrect more often than the second one.

Question 11

Very well answered with many fully correct responses. Some rounded the value for *AC* to 17 and this resulted in the final answer being outside the accepted range.

Question 12

Both parts were challenging for a significant number of students and this question was a good discriminator. Students could score marks for relevant working even if this was seen in the wrong part.

In part (a) many presented their work well and with sufficient detail to show what was required. Many could expand one bracket correctly with most errors being made if their method involved expanding $(7-x)^2$. A significant number thought they needed to use the centre of the circle and others attempted a solution to the given quadratic equation without making any attempt to answer (a).

In part (b) most attempted a solution using the quadratic formula with those using completing the square rarely being successful. Using -18^2 instead of $(-18)^2$ was the most common error. Some students gave both x values as their answer without working out a y-coordinate. Most gave answers to two decimal places.

Question 13

Very well answered with many fully correct responses. Most students scored at least two marks.
Some thought that the answer had to have a positive coefficient of x^3.

Question 14

A common error was to work out y as $\frac{1}{9}$ at the outset. Omitting brackets from $\left(\frac{1}{2}\right)^x$ was also seen quite often but overall, the question was well answered.

Question 15

Most students were able to factorise the quadratics although some errors with signs were made. Those students who 'solved' quadratic equations and tried to use the roots to work back to the factors were nearly always unsuccessful.

Question 16

This question produced a good spread of marks and was a good discriminator. Those who tried to eliminate the denominator sometimes divided both parts of the numerator. Other errors included writing an incorrect power of x for $\sqrt{x^3}$ and multiplying powers when they should have been adding them. Those who multiplied numerator and denominator by $\sqrt{x}$ were rarely able to score marks as processing errors were common.

Question 17

Part (a) was quite well answered. A common error was to omit the area of the base of the cone which usually meant they had l as 32. Many of these students went on to score SC2. Another error was to omit π in the initial working. Others worked out the angle at the top of the relevant triangle.

Many had the 36° angle in the wrong place in part (b), but more students were correct than failed to score.

Question 18

Most students eliminated the fraction correctly. Some sign errors were subsequently made when rearranging the terms. Writing $3m^3k$ instead of $3mk^3$ was quite common. Transcription errors from one line of working to the next were also quite often made. Overall, the question was well answered but a number of responses were poorly presented. For example, when taking the cube root sometimes only the numerator was inside the cube root symbol.

Question 19

Many attempted a full expansion. The most common error was to have a in the two relevant terms rather than a^2 and a^4. After correctly writing 10×3^3 a significant number of students evaluated this to 90. Many set up incorrect equations in a and x rather than using the coefficients.

Question 20

There were many fully correct responses to this problem-solving question. Common incorrect gradients for the radius were $\frac{9}{5}$ and $\frac{4}{3}$. Many knew the relationship between perpendicular gradients but some either did not change the sign or did not work out a reciprocal. For the later marks most attempted to use an equation of AB in the form $y = mx + c$. Some worked out double the correct area due to using an incorrect area formula.

Question 21

This question was answered quite well and there was a good spread of marks. Most worked out the inverse function correctly and knew how to start working out the composite function. Errors made included not including the 18 and expansion errors in $\left(\frac{2-x}{3}\right)^2$. Some forgot to add the inverse function to the composite function at the end.

Question 22

Various approaches were possible, and most were seen. About a third of the students showed correct working to obtain the given relationship between x and y. Giving all of the formal reasons proved more challenging but some excellent proofs were seen. Sign errors were sometimes due to not using brackets where appropriate. Although it was not necessary to draw extra lines on the diagram some students were able to score marks from this approach. A number of responses were poorly presented.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.