Level 2 Certificate
Further Mathematics

83602 Paper 2

Report on the Examination

Specification 8360

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General
Most students completed the paper in the time allowed. Work was often well presented but students should ensure that questions that require them to 'show that' a result is true, write in all appropriate steps. Some students did not understand that some expressions need simplifying before they can be differentiated. Others continue to find work on matrices and trigonometric identities challenging.

Topics that were well done included:

- gradient of a line
- drawing a graph
- algebra problem involving geometry
- expanding the product of three brackets
- integer solutions of a linear inequality
- angle between a line and a plane.

Topics which students found difficult included:

- range of a function
- matrix equation
- factorising (Q14(b))
- matrix transformations
- trigonometric identities.

Question 1
Part (a) was well answered. Some students equated the denominator to zero. Part (b) was not answered very well.

Question 2
Many fully correct responses were seen. The common error was to attempt a gradient but with an inverted fraction.

Question 3
Part (a) was well answered. In part (b) it was quite common to see rearrangements that had not substituted the value 2 for p. After obtaining a correct equation, the solution $m = 0$ was quite often not given.

Question 4
This question was well answered. The common incorrect choice was the first box.

Question 5
This question was well answered.

Question 6
Part (a) was not well answered. $x \geqslant 7$ was a common wrong answer. Some included infinity as a bound. Part (b) was answered quite well and was a good discriminator. Once again it was common to see x used instead of $g(x)$. Part (c) was answered well overall. Some made rearrangement errors after expanding the bracket while others gave solutions to 3 significant figures instead of to 3 decimal places.

Question 7
This question was well answered.

Question 8
Many students worked out lengths of sides of the triangle and this approach usually led to no marks being gained. Those who worked out the coordinates of point *P* were more successful although at least one of the coordinates was often incorrect.

Question 9
Many students did not realise they needed to simplify the expression before they could differentiate. Those that did simplify usually completed the question correctly.

Question 10
Most of those who obtained two correct equations were able to solve them correctly although sign errors were seen when eliminating a variable. It was quite common to transpose the two column vectors or to be unable to set up a correct matrix equation in the first place.

Question 11
This question was very well answered.

Question 12
In part (a) most students obtained a single fraction with a valid common denominator. A majority of these also had the simplest form. In part (b) many did not attempt to cancel common factors, instead attempting to multiply out the numerators and denominators. Many had several attempts on additional pages.

Question 13
Part (a) was not well answered, with many giving the answer 2 or attempting to find a value for x. Part (b) was answered more successfully although still not very well. Part (c) was a good discriminator. Some only gave the two intersections with the x-axis while others included the points (180, –1) and (360, 1).

Question 14
Part (a) was well answered. Only a small proportion could factorise fully in part (b). Some omitted brackets and many did not make any progress at all. Part (c) was a good discriminator. A common error was to divide by 3 at the outset before attempting to factorise.

Question 15
There were a significant number of fully correct answers. Common errors including differentiating before expanding the brackets and substituting $x = -2$ into y or the second derivative.

Question 16
This question was well answered although some poor presentation of work was seen. Those who simplified $2A + 3B$ to $1 - x$ before attempting to square were generally more successful than those who tried to expand $(2A + 3B)^2$ in terms of A and B before converting to an expression in x.

Question 17
Part (a) was not very well answered with a common error being to write -5^2 rather than $(-5)^2$. Others wrote 25 + 4 without showing how the 25 was worked out. In part (b), a common wrong approach for this specification was to attempt differentiation to work out the gradient of the tangent. Others did not know the relationship between the gradients of perpendicular lines. Some worked out the equation of the tangent and gave this as the answer.

Question 18
Part (a) was well answered. The common error was to use an incorrect inequality symbol in the working. Many students identified 4 and 7 in part (b). Giving the final answer as $4 > x > 7$ was the most common error.

Question 19
Many students could not write or work out all three matrices that represented the given transformations although some did get one or two correct. It was common to see poorly presented work with many restarts on additional pages. Only a small proportion of responses were fully correct.

Question 20
Part (a) was well answered and part (b) was quite well answered. Those who could identify the correct angle in part (b) nearly always worked it out correctly.

Question 21
This question was a good discriminator. Identifying the maximum point was more often correct than identifying the stationary point of inflection.

Question 22
In part (a) many students squared the expression but this usually led to $64 \cos^2 x + 25 \sin^2 x$
Some gave an answer of 58° or –58°. Part (b) was answered a little better than part (a) although there were a significant number of non-attempts to both parts.

Question 23
This question was a good discriminator with most students able to gain some of the marks. Many could apply the first machine correctly but a common error in the second machine was to have ak^2 instead of a^2k^2. Those who did have two correct expressions could quite often obtain a correct expression for a^2 but then made no further progress.

Question 24
There were a significant number of fully correct solutions. Most successful answers used powers of 3 with a few students gaining some marks from using powers of 9. A common error was to simplify $3^p \times 3^4$ to 3^{4p}

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

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