GCE

MATHEMATICS

MPC2 Pure Core 2
Report on the Examination

6360
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General

It is pleasing to be able to report that students again answered questions in the required spaces, with supplementary paper being used by students where this proved necessary, as instructed by the rubric on the front of the paper. The students' work was generally well organised. However, there were a minority of scripts where students offered more than one attempt at a solution, each equally substantial; this was not usually to their advantage due to the averaging of marks and rounding down in such cases. Such students would have been better advised to make a decision and then cross out the weaker attempt. In general the paper seemed to be well attempted with no obvious indication that students were short of time to complete the paper.

Question 1

This opening question, which tested the use of standard formulae for a geometric series, proved to be a welcome starter with a large majority of students scoring full marks.
Part (c) was the least well answered where some students used $n=11$ in the relevant formula for the sum, S_n, of a geometric series.

Question 2

This question tested the basic trigonometry section of the specification. Finding the arc length and area of the sector was again generally done correctly, with students recalling and using the correct formulae. In part (c) most students were able to find an angle of 1.27 radians using the sine rule but a majority of these then failed to realise that this is an acute angle and did not subtract it from π to find the correct obtuse angle. A small minority of students chose to convert 0.8 radians to degrees before doing any calculations in part (c). They were not penalised for doing this and could score the final mark if they correctly converted the 107° back to radians.

Question 3

This question tested expansion of brackets and integration of negative exponents.
The majority of students used the binomial expansion or expanding brackets successfully in part (a). Typically in a(ii) they repeated their working from part (a)(i), replacing y with x^{-2}, rather than replacing it in their simplified expansion. Most students scored at least M1 for this part, however a significant number of students were unsuccessful in finding a correct expression for $\left(2-x^{-2}\right)^{3}$ and hence did not find the correct values of p and q.
Those students who did not use "hence" but used a correct different method to the one they used in a(i), could gain a maximum of 2 out of the 3 marks. Part (b) made use of the answer to a(ii) and those that had found values for p and q were generally able to correctly integrate their expression, $p+qx^{-4}$, and evaluate it using the given limits in a correct manner.

Question 4

The sketch of the given exponential curve was usually drawn having the correct intercept at $y = 1$, but a significant minority of students did not show its correct behaviour for negative x values – the curve should level out close to the *x*-axis and certainly nearer to the *x*-axis than the line $y = 1$. Part (b) was usually answered correctly with almost all showing that they knew how to use logarithms to solve an equation of the form $a^x = b$. The positioning of the minus sign was crucial in part (c) and it was not uncommon to see the incorrect answer $f(x) = -9^x$.

Question 5

The trapezium rule question in part (a) was generally well answered with the majority of students taking care to include sufficient brackets and rounding their final answers to the required degree of accuracy. In part (b), many students correctly recognised the transformation as a stretch and a majority of these stated its correct direction. However, only the most able students stated the correct scale factor as 2 with most other students incorrectly stating it as either 8 or $\frac{1}{8}$. Although fully correct solutions to part (c) were rare, a significant number of students did gain some credit. The most common approach was to first find an expression for $g(x)$ before substituting the value 4 for x. Other than sign errors, the most common error was to write $g(x) = \sqrt{(x-2)^3 + 1 - 0.7}$ or its equivalent. Those who gave the correct expression, $\sqrt{(x-2)^3 + 1} - 0.7$, usually went on to score all 3 marks. The other approach, attempting to find and use the original point to transform, was rarely seen.

Question 6

A majority of students could cope with the powers in part (a) but a significant proportion of others ended up with the wrong second term by thinking that the denominator x should be placed under both the x^2 and the $x^{1/2}$ terms resulting in a common error of the second term being given as $x^{1/2}$ rather than $x^{3/2}$. Most students showed that they could differentiate accurately and a large majority showed that they knew the method for finding the equation of the normal to a curve, with many scoring at least 3 of the 4 marks in part (b)(ii). The final part of the question, which introduced the stationary point, usually gave average students the opportunity to pick up the first mark but in general only the most able students could then cope with the fractional indices to correctly reach $x^{5/2} = 8$ and then to solve this to show that the *x*-coordinate of the stationary point could be written as $2^{6/5}$.

Question 7

This question on sequences proved to be a discriminating one. The more able students were able to write down and solve two correct simultaneous equations in p and q, using the given information but other students were keen to use either arithmetic or geometric series inappropriately. A majority of students wrote down the correct equation using the information about the first and second terms, however many could not then translate the further information about the limit into a corresponding correct equation. Using the given value of p, most students answered part (b) correctly by finding the correct values for q and u_3.

Question 8

In this question, which tested logarithms, most students scored the mark in part (a) but not all could see its use at a later stage in part (b). Not unexpectedly, part (b) proved discriminating, with a majority of students only picking up one of the six marks, normally for writing $2\log(x+7)$ as $\log(x+7)^2$. The remaining students, who correctly applied a further law of logarithms to reach the stage $\log_2 \frac{(x+7)^2}{x+5} = 3$, either stopped at that point or went on to find the correct quadratic equation. In the latter case, most went on to solve the equation correctly but the required concluding statement 'only one value of x' was not always given and so the final mark was lost. Some students who recognised what was being asked for frequently obtained the correct quadratic equation, showed that $b^2-4ac=0$ and then stated 'only one value of x' for full marks.

Question 9

Sketching a convincing tangent graph, even with graphical calculators available, seemed a considerable challenge for many. Three separate branches were needed with the correct intercepts on the x-axis and demonstration of the tendency near 90º and 270º. It was disappointing to sometimes see a sine or a cosine graph drawn instead. Many students correctly solved the trigonometric equation in part (a)(ii) although a minority of students incorrectly gave more than two solutions inside the given interval. The majority of students were able to recall and use the required two trigonometric identities in part (b)(i) but not all were able to reach the printed answer without there being a sign error in their working. In the final part of this last question on the paper it was important that students recognised that they were required to use 'Hence' and also that the equation to be solved was in terms of $3x$. Those students who just solved the equation in part (b)(i) without ever dividing its solutions by 3 or writing '$\theta = 3x$' were heavily penalised. Those students who did link θ to $3x$ generally recognised and solved the quadratic in $\cos 3x$ but a significant minority then failed to find a third solution for x in the given interval.

Mark Ranges and Award of Grades

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

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator www.aqa.org.uk/umsconversion