Examiners' Report
Principal Examiner Feedback

November 2020

Pearson Edexcel International GCSE
in Mathematics (4PM1)
Paper 01R

Edexcel and BTEC Qualifications

Pearson: helping people progress, everywhere

November 2020

Publications Code 4PM1_01R_2020_ER

International GCSE Furth Pure Mathematics – 4PM1

Principal Examiner Feedback – 4PM1 01R

Question 1

Most students were able to correctly substitute the given value of t to achieve an exact value for part (a) as required. Occasionally, an exact value wasn't given for the final answer.

In part (b), many students correctly quoted the maximum value for the given function, but fewer students were able to quote the minimum value, quoting 3 as the minimum value instead of 1. In these cases, students had assumed the minimum value of the sin part of the function to be 0 rather than -1.

A large number of students correctly started part c by substituting $P = 4$ and rearranging the equation. Most students succesfully identified the correct solution, though occasionally students solved the equation with values initially obtained in degrees rather than radians.

Question 2

On the whole, this question was answered well by most students.

A large number of students successfully completed the square for part (a) and most continued to succesfully solve the equations simultaneously in part (b). Occasionally, students omitted to find the associated y values to fully solve the equations simultaneously.

On the whole, students who had succesfully completed parts (a) and (b), went on to succesfully sketch the graphs required for part (c). A small number of students didn't label the points of intersection effectively, instead relying on a scale drawn on the x and y axes. The small number of students who had found parts (a) and (b) difficult, found part (c) more challenging, though were able to pick up the follow through marks available.

Question 3

A significant number of students were able to score full marks on this question, using a variety of methods. Some students used methods which involved using the standard notation for arithmetic sequences, rather than simply substituting the given values for n into the formula given for u_n.

Some students were unable to recall or successfully use the laws of logarithms required to make progress and arrive at a format which would enable the correct solution of the simultaneous equations formed.

Question 4

This question was answered well by most students, almost all realising they needed to differentiate and solve the resulting expression equal to 0. There were occasional errors in the solution of this equation. Occasionally, a student found the value of x and failed to identify the correct values of y to obtain the required coordinates.

A majority of students realised further differentiation was required for part (b) and almost all of these students looked to use the second derivative to succesfully classify the nature of the stationary points identified in part (a). Rarely was any other method used to answer part (b).

Question 5

Most students were able to succesfully use the binomial expansion to gain full marks for part (a), the most common error being to fail to use "-x" correctly in the expansion.

Similarly, most students were able to identify the correct value of 0.08 and use this in their expansion to gain all or some of the marks available for part (b). Very occasionally, a student had simply used their calculator to find $\sqrt{0.92}$.

In part (c), it was more common to see a calculator used to find $\sqrt{23}$. More students were unable to make the required link with parts (a) and (b) of this question.

Question 6

A large number of students were able to gain full marks in part (a). As a question requiring a result to be shown, work was generally clear and well set out.

Most students were able to successfully make the link between parts (a) and (b) and arrive at the correct expression required.

A significant number of students correctly used their expression from part (b) to make progress with part (c). A relatively small number of students didn't successfully deal with the factor of 3. Some students didn't realise the link between parts (b) and (c), incorrectly integrating a product of each trigonometrical functions by integrating each function to get an incorrect expression of a product of two trigonometrical functions.

A small number of students showed no working, despite the question stating ‘use calculus’. Some students who had incorrectly integrated, would have been able to pick up a method mark if they’d shown the substitution of limits step in their working.

Question 7

A large number of students attained full marks in part (a); very few students were not able to attain most marks in this part of the question. The most common error was an incorrect expression for the volume of the cube or an incorrect differentiation. Most students were able to recognise a chain rule was required and correctly state a valid chain rule.

In part (b), significantly fewer students were able to gain full marks. Many students were able to arrive at an expression for the area and where this was the case, often made good progress with the question. The linking together of three variables with a valid chain rule proved to be more of a challenge than the chain rule required for part (a).

Question 8

Part (a) of this question was generally answered well. When a student didn’t attain full marks, they failed to successfully bring the required part of the expression to a common denominator. Very occasionally, a student didn’t correctly substitute their sum and product of roots.

In part (b), many students made good progress and a significant number attained full marks, but the algebra required to arrive at an expression ready for substitution of the sum and product of roots (the second mark available) proved a challenge for some students.

Question 9

This question was answered well by a large majority of students, but divided students into those who secured all or most of the marks and those that struggled to make any progress. Students tended to favour using the first alternative method and when students worked in this way, a full solution was often present. There were occasionally errors in changing the powers.

When students chose to use the second method, there were often errors in the substitution required.

Question 10

Most students were able to find the principal angle required in solving the equation in part (a). A significant number of students were unable to identify all three angles required, often missing $\frac{7\pi}{3}$.

In part (b), almost all students were able to gain the first and second method mark, solving using inverse tan and identifying one or more of the required angles. A number of students who had gained these marks didn't gain the third mark, omitting usually one angle, most commonly -239°.

Most students were able to make good progress with part (c), securing at least the first two marks. Many of these students realised there was a quadratic equation to solve and made at least a good attempt to solve this. When marks were lost in this part of the question, this was most frequently observed when finding the required angles for $2y$ and then y.

Question 11

This question proved a challenge for all but the most able. Many students were able to gain the first mark, but then struggled to make further progress.

Able students realised they needed to find and compare two vector paths for part (b). When students realised this, they often made good progress and attained full marks in this part of the question. Very few students attained only part marks for part (b).

Part (c) was answered only by the most able students, with a majority of students unable to answer this question. Again, part marks were rare for this part of the question.

Question 12

The overwhelming majority of students were able to find the x coordinate of A and most students were able to find the x coordinate of B. Some students were unable to rearrange the equation to reach $\tan x = 1$. Most students obtained the correct expression required for part (b).

Many students were able to correctly determine the integral required. Most of these attached the correct limits and showed the stages in their working. Few students attempted a calculator only solution. The final mark was frequently lost for the answer not being in the required form or for working in degrees.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom