Examiners' Report

Summer 2014

Pearson Edexcel GCE in Core Mathematics 1R (6663/01R)

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Specification 6663/01R

General Introduction

Mostly students answered this paper well with the modal mark being full marks on every question. Weaker students made slips and errors in arithmetic, in basic algebra and in copying down information but there were also some very good students who had been well prepared for the examination and who avoided these errors.

Report on Individual Questions

Question 1

This question was generally very well answered. Most gave the answer in the form given in the main scheme. Some students only took out the x term then stopped and others lost two marks as their first line was $x(9x^2 - 25)$ with wrong signs. It was very unusual to see anyone misunderstanding the instruction to factorise and continuing their answer by 'solving' to $x = ...$ This was a good opening question.

Question 2

This question was generally done well . In Q02(a) **t**he common mistakes were not evaluating 9^3 or 3^6 or incorrectly evaluating 9^3. Some evaluated 81^3 first, then struggled to find the square root on this non calculator examination.

In Q02(b) **s**ome stated incorrectly that $\left(x^{-0.5}\right)^2 = x^{1.5}$ or that $16x^{-1} = \dfrac{1}{16x}$

Others stated that $\left(x^{-0.5}\right)^2 = x^{0.25}$ or $x^{0.25}$. Another common error was not squaring the 4 at the start of the bracket and only dealing with the x term.

Question 3

This question was generally very well done. Q03(a) was usually correct.

In Q03(b) there were some fairly common errors. A minority used the formula for the sum of an AP. Some put a_3 equal to 66 and another group of students did not put their sum equal to 66. There was also some weak algebra solving the linear equation in k .

Question 4

Q04(a) was usually correct. Any errors were usually in dealing with the second term, expressing $\dfrac{6}{\sqrt{x}}$ as a multiple of an index and then differentiating.

In Q04(b) the main difficulty was in the integration of $\dfrac{6}{\sqrt{x}}$. There were a few but not many, who integrated their answer to Q04(a).

Question 5

This question was well answered. Some however found it challenging to get beyond $\sqrt{2}x = 10$ or $x = \dfrac{10}{\sqrt{2}}$

Other errors were, for example, replacing 20 by $\sqrt{4}\sqrt{5}$ and then by $2\sqrt{5}$, or replacing10 by $5\sqrt{2}$.
Some rationalised the denominator $\left(6 - \sqrt{16}\right)$ creating extra work instead of simplifying it to 2.
Others thought they could remove the roots by squaring, which creates a second, invalid, solution.

Question 6

Most students did fairly well on this question. The most common mistake was putting their inequality in Q06(b) as their answer to Q06(c) and not trying to combine their two inequalities.

In Q06(a) **t**he most common error was to give a wrong expression for perimeter (usually neglecting one or two of the sides). Those who gave a correct expression usually completed Q06(a) successfully.

In Q06(b) a wrong expression for area was less common - most divided up the inside region to obtain their expression. The resulting quadratic was usually solved correctly and most students chose the inside region, as required. A minority put $A = 120$ so did not have an inequality or put $A > 120$ and obtained the wrong inequalities. Credit was given to those giving the answer as $-3 < x < 2.5$ and also to those who realised that x was a length and so gave the answer as $0 < x < 2.5$

In Q06(c) some students made no attempt to combine their answers to Q06(a) and Q06(b).

Question 7

This proved more challenging than the earlier questions.

In Q07(a) students were usually able to get the first three marks by a variety of methods, although a few transposed the x and y coordinates when substituting, or mixed them up . Signs were an issue for some, particularly when finding the gradient.

Having got the correct equation, some made no attempt to change it to the correct form. Others made arithmetic/algebraic errors. Those who did have all three terms on one side sometimes ignored the need for 'integers' or '= 0'.

In Q07(b) the most common method used was finding the equation of MN, then substituting $x = 16$. Those using Pythagoras were often successful.

In Q07(c) it was usual to see their final answer as the coordinates of K, rather than just the y coordinate as requested. (This was not penalised). Some realised that they just needed to add 6 to p (although they did it in a variety of different ways). Quite a few correctly solved the simultaneous equations generated by the line equations for KL and KN . A handful used vectors. Those who tried to use Pythagoras were usually unsuccessful, not realising that it would generate two solutions, so were confused if they managed to reduce it to a quadratic equation. A significant minority assumed wrongly that $x = 7$. An interesting method came from those who realised that, as it is a rectangle, the diagonals LN and KM bisect each other, hence the midpoints are the same.

Question 8

Most students integrated the two terms correctly, though a few could not deal correctly with $x\sqrt{x}$. Those who gave it as x to the power $\frac{3}{2}$ usually had no problem integrating and dividing by the fraction $\frac{5}{2}$. A minority missed the constant hence losing the last three marks. Some students made arithmetic mistakes in working out the constant. A very small minority tried to differentiate instead of using integration as the reverse of differentiation.

Question 9

This question was a reasonable discriminator.

In Q09(a) the quadratic and linear graphs were generally well drawn. Marks were lost due to the omission of co-ordinates particularly the $\frac{-k}{3}$.

For Q09(b) students were asked to determine a value for k for which the given line was a tangent to the given curve. There were several possible methods of solution. The method using $\frac{dy}{dx}$ was the most popular approach. Those who began correctly by this method putting the gradient expression for the curve equal to the gradient of the line, usually completed it to find x, then y, then k. Many who attempted instead to set the curve expression equal to the line expression obtained a quadratic but proceeded no further. Of those who continued with this method, use of the condition for equal roots, putting the discriminant equal to zero usually was more successful than completion of square methods.

Question 10

Q10(a) required students to show a printed result. It was extremely rare to have brackets missing. The formula was not usually quoted, but students should be advised that including the formula would make their method clearer.

In Q10(b) some students when copying made errors such as wrong signs or 13 changing to 3. The time for Yin was usually correct, but not always simplified correctly. A few students used A instead of $A-13$, as their first term. Most students equated the two times and solved to find d. A few treated their times as simultaneous equations usually coupled with '$=0$' and obtained $d=3$ after incorrect assumptions.

For Q10(c) the formula for sum was not usually quoted but students were able to use it with $n=14$ and usually got the first M1. However, depending on how they had set this up initially, many had not taken into account that for Xin the difference between the terms is actually $d+1$, and so were unable to gain any more marks. There were sometimes further arithmetic errors. Several students did not use the sum formula instead putting Xin's time for day 14 = 784.

Question 11

This was a well answered question .

In Q11(a) most students understood the method and used the curve equation to find the value for y, then differentiated to find an expression for the gradient of the curve. They found a numerical gradient at $x = 2$, then used the negative reciprocal to obtain a numerical gradient for the normal. A few students found $y = 3$ by an incorrect method, using the line equation which they were trying to find, hence producing a circular argument. Differentiation of $\frac{18}{x}$ was a challenge for some, and others made errors calculating the numerical gradients. The printed answer gave them an opportunity to check for errors.

Q11(b) was particularly well answered, and most showed good algebraic skills on this question. Very few students attempted the quadratic in y, mostly using the most concise method of solution, involving x. Some students forgot to find the second coordinate.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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