Pearson Edexcel

Principal Examiner Feedback

Summer 2018

Pearson Edexcel GCE Mathematics

Core Mathematics C1 (6663/01)

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Introduction

The paper offered plenty of opportunity for students to demonstrate their knowledge of the Core 1 specification. There were some very good responses seen, but also some cases where the standard of algebraic manipulation was disappointing. The questions that were the most discriminating were, 3(c), 5, 9(b). As in previous series, students should be encouraged to provide sufficient and accurate working in "show that" questions. It was noted that in part (a) of question 7, almost all students knew the correct approach to obtain the required inequality, but were careless in their presentation, with signs and brackets incorrectly placed.

Comments on individual questions

Question 1

In part (i), most students were able to score at least one mark for either for simplifying $\sqrt{48}$ to $4\sqrt{3}$ or for rationalising the denominator of the fraction but, having made a correct start, some students then made heavy going of the subsequent processing. A significant number of students, having arrived correctly at the answer of $\frac{6}{\sqrt{3}}$, did not go on to rationalise the denominator.

Part (ii) was done less well. By far the most successful strategy was to write 81 as 3^4 and then equate powers, although some students then made errors in solving $6x - 3 = 4$ with

$x = \frac{6}{7}$ seen a few times. A significant number of students wrote 81 as 3^3. A few took logs of both sides but success was variable with this approach. Others tried expressing 3^{6x-3} as $3^{6x}\times3^{-3}$ to gain the first mark but lost the method mark as they were then unable to finish as having multiplied 81 by 27 they failed to recognise this as 3^7 or evaluated 3^3 as 9. As in previous series, students sometimes struggled to process indices correctly.

Question 2

Generally this question was answered well.

Part (a). This question was done well with most students were able to integrate all the terms correctly and include + c with their final answer. A common, but relatively rare, error here was to calculate the coefficient of x^2 as 3÷0.5 rather than 3÷1.5

Part (b). In part (i), most students were able to differentiate the expression correctly. Common errors here were either not to multiply the 3 by $^1/_2$ or to divide the 3 by $^1/_2$. In part (ii), most students were able to put their $\frac{\mathrm{d}y}{\mathrm{d}x}$ equal to 0 and obtain a correct expression in the form $x^n = C$, but a surprising number of students, having obtained correctly either $x^{-0.5} = 4$ or

$x^{0.5} = \frac{1}{4}$ were then unable to proceed from this to the correct answer of $\frac{1}{16}$.

Common incorrect values of x following a correct equation were $= \frac{1}{2}$, $x = -\frac{1}{2}$, $x = \frac{1}{8}$.

Question 3

Part (a): Most students were able to express f(x) in the required form. Common, but relatively rare, incorrect answers here were $(x + 5)^2 – 2$ and $(x – 5)^2 + 48$.

Part (b): This question was done well. Most students were able to either use their answer from part (a) or start with the quadratic formula to obtain the required solutions of the quadratic equation. Although not penalised in this part, a surprising number of those students using the quadratic formula approach were unable to simplify their answers to a correct form. A common error here was $\frac{10 \pm \sqrt{8}}{2} = 5 \pm \sqrt{8}$.

Part (c) was not done as well. Many students thought incorrectly that they had to substitute their answer to part (b) in to the given quadratic equation. Of those students who realised that they needed to square the larger of their answers to part (b), many were unable to do this correctly. A common error here were to incorrectly square their expression as, e.g. = 29 + √2 (from 25+10√2+4), or occasionally 27 (from 25 + 2) and 29 (from 25 + 4). A significant number of students gave both the larger solution and the smaller solution of quadratic equation as their final answer.

Question 4

Part (a) was done well. Most students were able to find out how much was paid into the saving scheme in year ten. The vast majority of students did this by using a suitable formula, rather than by listing all the payments. A common error here was to not to add the 600 to the 1080 for the total payment.

In part (b), most students were able to use the information to find the correct value of N. Almost all the students were able to identify $d = 80$ for Kim, and the vast majority were able to set up at least one of the summation expressions correctly, in terms of n, for either Andy or Kim, usually both were correct although a small minority used the term formula rather than the sum formula. Those who correctly set up the equation with S_n(Andy) = 2 x S_n(Kim) were able to solve it correctly to reaching $N = 18$. The most common error here was to set up the wrong equation using 2 x S_n(Andy) = S_n(Kim) and arrive at the unrealistic value of $N = -\frac{99}{8}$. It was not clear if students, who clearly obtained incorrect answers with negative or fractional N, looked back to see to check their working or their initial equation. Listing methods in this part were very rare and usually unsuccessful given the nature of the calculations required.

Question 5

In part (a), most students were able to identify the coordinates of the turning point after the transformation. A common incorrect answer here was (0, 7) and some students included other points which meant that they forfeited the mark.

Part (b) was not done as well. Many students were able to state the solution of the given equation, but a significant number of students were unable to relate the solution of the equation to the intercept on the x-axis. A common error here was to state additional points or coordinates other than the one required.

Part (c) was the most successful and most students were able to write down the equation of the asymptote. A common incorrect answer was $y = -1$. The incorrect asymptote of $x = 0$ was seen a significant number of times.

Part (d) discriminated well and it was unusual to see both marks scored here. Many students were able to state one of the required answers (usually $k \leq 1$), but few were able to state both. Common incorrect answers here were to omit $k = 7$ entirely or give the range as $k < 1$.

Question 6

Part (a): Most students were able to use the iteration formula to find the second, third, and fourth terms of sequence and give their final answers as simplified fractions but a significant number of students were not awarded the final mark as they had not simplified their fraction for the fourth term in the sequence, which was often left as $\frac{36}{117}$ or $\frac{12}{39}$.

In part (b), many students were able to set up a pair of simultaneous equations to find the values for p and q, or at least state a value for $p = 4$ but mistakes here often resulted from forming incorrect simultaneous equations. Some simply found the $4n - 3$ from the arithmetic progression of the simplified denominators. Those who had produced simplified answers in part (a) found it much easier to find p and q. Others noted $p = 4$ but often wrote $q = 1$.

In part (c), many students were able to use their values of p and q to set up and solve an equation to find N for the given Nth term. Common incorrect answers here were 80 (from $p = 4$ and $q = 1$) and 160 (from $p = 2$ and $q = 1$).

Question 7

The majority of students were able to rearrange the quadratic equation and use the discriminant correctly to prove the required result but many students lost the final mark in the proof due to inaccuracies in their presentation. Common errors include omitting one or more brackets in algebraic statements, the casual treatment of signs (particular minus signs) and also the casual use of inequalities/equalities. It is important that students are aware that the appearance of the "< 0" for the sign of the discriminant is required at some point before the final printed answer in order to score full marks in this kind of question.

Part (b) was very routine and is the type of question that has been set many times. Most students were able to find the critical values of the inequality and write down the correct "inside" region for the solution, usually as a single statement. Common incorrect answers include inequalities for the "outside" region and writing the region as two separate inequalities with an unacceptable connective, e.g. $k < -2.5$, $k > -4$. There was the usual, not insignificant, minority of students who stopped once they had found the critical values or simply copied the $<$ symbol from the inequality and wrote down $k < -2.5$, $k < -4$.

Question 8

In part (a), most students were able to write down the gradient of the line. Incorrect answers seen were $\frac{5}{4}x$ and 5 given as the gradient.

Part (b) was generally done well and most students were able to find the equation for the given straight line although some did not write it in the required form. A common incorrect form for the answer here was $4y = 5x - 40$.

Part (c) was done well, most students were able to write down the coordinates of the points *B* and *C*, though a surprising number of these did not use the formal coordinate form for their answers. Students should be advised that when asked to give the coordinates of a point they should use the notation (x, y).

Part (d) was poorly answered by many, including the more able students, and rather too many students were unable to find the area of the given parallelogram. A very common unsuccessful approach was to use Pythagoras to find the length of *AD* or *BC* unnecessarily and then treat the parallelogram as a rectangle, e.g. calculate the area as $AB \times AD$. When the area was successfully calculated, the most common approach was to divide the parallelogram into triangles and a rectangle.

Question 9

In part (a), most students were able to find the correct expression for f(x) although there was the occasional careless error in the evaluation of the constant.

Part (b) was met with varied success, depending on the choice of approach. Many of those students opting to equate coefficients to prove the result were less successful than those opting to factorise the expression. A common incomplete method when opting to equate coefficients was not to state, or derive explicitly, the value $A = 4$ for each coefficient of the expression. However, some students did recover by expanding $(x - 3)^2(x + 4)$ and showed it was equal to their answer in part (a) and therefore recovered the marks.

Part (c) was done quite well and most students were able to sketch a suitable graph for f(x), i.e. a positive cubic, and show the double root at $x = 3$, the root at $x = -4$ and the correct intercept on the y-axis ($y = 36$). A very common error was to sketch the maximum of the curve at $y = 36$ when in fact the maximum was in the second quadrant. Students should be advised to draw smooth curves and some of the sketches left a lot to be desired.

Question 10

In part (a), many students were able to find the equation for the required line. Most students were able to use differentiation correctly to find the gradient of the tangent, and hence the gradient of the perpendicular line, and use an appropriate method to find the equation of the tangent. A common but rare incorrect approach was to use the given answer to derive the given answer, i.e. by obtaining the gradient without the use of differentiation and gained no credit.

In part (b), many students were able to equate the equations of the curve and straight line to obtain the correct quadratic equation for the simultaneous equations although there were many algebraic errors when rearranging the equation into a quadratic form. Most of those students who able to obtain the correct quadratic equation were able to solve it correctly, usually by factorisation, for the correct values of x, and use $x = 90$ to obtain the correct coordinates of B. A small number of students attempted to use the quadratic formula to solve the equation, generally with little success because of the numbers involved.

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