Examiners' Report/
Principal Examiner Feedback

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GCE Core Mathematics C2 (6664)
Paper 01

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General Introduction

The questions on the whole were well answered with many fully correct solutions. Candidates found the paper accessible and standard methods were accurately applied. The standard of presentation was good with solutions showing logical steps.

Report on Individual Questions

Question 1

This question was well done by the vast majority of candidates. The most common method was to use the general expansion for $(a + b)^n$ and this was largely successful although there were some common errors. The most frequent error was the failure to square the –5 in the third term resulting in an expansion of $64 – 960x + 1200x^2$. It was also common to see an answer of $64 + 960x + 6\text{-}00x^2$. A minority of candidates attempted to take out a factor of 2 before using the expansion for $(1 + x)^n$. Some candidates took out the factor of 2, without realising that it needed to become 2^6.

Question 2

Candidates found this question accessible. In Q2(a) most candidates attempted f(1) and proceeded to establish the given equation. However it is worth pointing out that a significant number of candidates presented work along the lines of $f(1) = a + b – 7$ and concluded that $a + b = 7$ with no reference to $f(1) = 0$ thereby losing a mark in this “show that” question.

In Q2(b) the majority of candidates correctly attempted f(-2) with a minority using $f(–2) = 0$ rather than $f(–2) = 9$. Although many candidates with correct work so far could then go on to find a and b, there were many examples of errors in solving the simultaneous equations. Very few candidates used long division.

Question 3

Q3(a) was well answered with most candidates gaining the mark for establishing the profit in 2016 correctly. The majority used the *n*th term although some listed the first 4 terms to show the result.

In Q3(b), many candidates adopted a correct approach using logarithms and established a value for their n or $n - 1$ but then did not give an answer in the context of the question, i.e. did not use their value of n to establish a calendar year. Those who did go on to find a year were sometimes confused as to which year their value of n implied. A significant number of candidates opted to take a 'trial and improvement' approach by experimenting with different values of n. While such methods can gain credit, candidates must be aware that they must show evidence of sufficient work to earn the marks. In this case, examiners would be expecting to see a value of n that gave the year before the profit exceeded £200 000 together with the value of n that gave the year after the profit exceeded £200 000 along with the associated profits. For this kind of approach, if the candidate then went on to identify the correct calendar year, full marks are possible. In this part, some candidates misinterpreted the question as requiring the year when the **sum** of the profits exceeded £200 000.
In Q3(c), a large number of candidates used the incorrect value of n in the correct sum formula. The use of $n = 10$ was the most common incorrect value.

Question 4

The majority of candidates began by correctly finding arccos (–0.4) (113.578...) and then proceeded to find the first angle (41.2). However, is was noted that in solving the equation $3x - 10 = 113.578..$, quite a few candidates used incorrect processing. A significant number subtracted 10 and divided by 3 and others divided by 3 and then added 10. In finding the other two angles that solved the given trigonometric equation, there were a variety of approaches including using the 'quadrant' method or by using sketches of $\cos x$ or $\cos (3x - 10)$. A number of candidates found all three angles correctly and gave them to the required accuracy.

Question 5

Many candidates were successful in finding the centre and radius of a circle in Q5(a). Completing the square was often done accurately leading to the correct centre and radius. Errors that were seen involved centres of, (–10, –12) or (20, 24) and some errors in the rearrangement in attempting to find the radius.

Q5(b) was probably equally well answered with the majority of candidates able to use Pythagoras successfully.

Q5(c) was found more challenging by candidates. Candidates who drew a diagram were more successful and spotted the need to use Pythagoras again although many had NP as the hypotenuse.

Question 6

In Q6(a) logarithms were challenging for the less able candidates. Although many could apply the power rule correctly to obtain 2log (x + 15) = log (x + 15)^2, some then proceeded to $\dfrac{\log(x+15)^2}{\log x} = 6$. Some candidates also erroneously started with $\dfrac{2\log(x+15)}{\log x} = 6$ or $2\log\left(\dfrac{x+15}{x}\right) = 6$ and were unable to gain much credit. The next stage was answered better and many candidates knew that to remove logs, 2^6 was required on the right hand side.

Q6(b) involved solving the quadratic from Q6(a) and the majority opted to use factorisation successfully. Some chose to use the quadratic formula and were less successful, making arithmetic errors or using an incorrect formula.

Question 7

In Q7(a) the majority of candidates could establish the printed angle by using the cosine rule. Some candidates chose to verify that the angle was 2.22 radians by again using the cosine rule to show that *ZY* was 9 cm. A small number of candidates worked in degrees and converted to radians at the end.

Q7(b) involved finding the area of the major sector *XZWX* but many candidates found the area of the minor sector. As an alternative correct method some candidates found the area of the minor sector and subtracted this from the area of the circle. Some candidates found the area of triangle *ZXY* and a minority of candidates made some attempt at the area of a segment.

In Q7(c), candidates recognised they needed to find the area of triangle *ZXY* and add the area from Q7(b). It was clear here that those with an incorrect Q7(b) did not understand the expression ‘major sector’ as they were able to score all the marks in Q7(c).

Q7(d) was met with more success although a common error was to add 11 to the minor arc length. Some candidates misinterpreted the perimeter and as a final step, added an attempt at the length *ZW*.

Question 8

In Q8(a) the majority of candidates differentiated correctly and then either chose to solve $\frac{dy}{dx}$ = 0 or substituted $x = \sqrt{2}$ to establish the turning point at P.

In Q8(b) many wrote down $x = -\sqrt{2}$ but also a significant number of candidates went back to the original equation in Q8(a) and attempted to find the other solution, with varying degrees of success.

The differentiation in Q8(c) was answered well and recovery was allowed from an incorrect derivative in Q8(a). There was a clear demand to establish the nature of the turning points at P and Q with justification. There were many cases where candidates made no reference to the fact that the sign of the second derivative was the determining factor and simply evaluated the second derivative at P and Q and stated whether they thought they were a maximum or minimum.

Question 9

This question was a good source of marks for many candidates.

In Q9(a), the missing values in the table were usually calculated correctly, however the second value was sometimes given as 3.633 rather than 3.634.

The Trapezium Rule was usually dealt with appropriately but the strip length was sometimes incorrectly used as $\frac{3}{7}$. More frequently, the final answer was not given to the required accuracy.

In Q9(b) the integration was often well answered but there were errors on the third and fourth terms (which involved negative and fractional powers). The limits of 1 and 4 were usually used correctly although candidates are advised to show clearly the substitution and evaluation of the limits to avoid losing unnecessary marks.

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