AS

MATHEMATICS

Unit Pure Core 2
Report on the Examination

6360
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General

The vast majority of students were well prepared for this exam. Presentation of work was generally good. Most students seem to have had the time to tackle all that they could answer. As in previous series, the questions which combined logarithms with index laws and also the part question requiring the use of trigonometric identities to show a printed result proved to be the most challenging.

Question 1

Most students applied the trapezium rule correctly in part **(a)** and gave their final answer to the required degree of accuracy. Omission of the outer brackets in the trapezium rule was seen but those students who recovered were still able to gain full marks. There was less evidence of arithmetical errors than in previous series. Very few students failed to score the mark in part **(b)**.

Question 2

Almost all students correctly differentiated the equation of the curve in part **(a)** and scored the mark in part **(b)(i)**. A very high proportion of students obtained a correct equation for the normal in part **(b)(ii)**. The most common error was to find the equation of the tangent at P. Students who found a correct equation for the normal but then made errors in subsequent rearrangement were not penalised. In part **(b)(iii)**, most students substituted $y = 0$ into their normal linear equation to score the method mark. However, any use of an incorrect rearrangement in part **(b)(ii)** resulted in being unable to gain the accuracy mark in this final part.

Question 3

Most students applied the cosine rule correctly to find the length of AC in part **(a)**. The usual arithmetical errors were seen, but more seriously, use of $\sin\frac{2\pi}{3}$ in a 'cosine' formula appeared occasionally.

In part **(b)(i)**, many students correctly found and used the reflex angle to obtain the correct value for the major arc. However, a significant minority did not score the final accuracy mark because they just stated the printed answer, 25.1, without first giving a value to a greater degree of accuracy. A minority of students found the length of the minor arc and then multiplied their answer by 2 to get the 25.1. If a valid justification was also given then marks were awarded.
Many students found the correct value for the shaded area. The most common errors were finding and using the area of the minor sector or using $0.5\times 6\times 14\sin\frac{2\pi}{3}$ for the area of the triangle.

Question 4

Almost all students scored full marks for parts **(a)(i)** and **(a)(ii)** in this arithmetic series question. As in previous years, students had less success in finding the value of a summation where the sigma notation is used. Slightly less than half the students scored full marks in part **(a)(iii)**. The usual error was seen, namely, students working with $S_{300} - S_{100}$, which only gained 1 mark, instead of

$S_{300} - S_{99}$. Other common errors included using $n = 200$ instead of $n = 201$ in the expression $\frac{n}{2}(u_{100} + 2714)$, and, more seriously, using $\sum_{n=100}^{300} u_n = u_{300} - u_{100}$.

In part **(b)(i)**, which tested geometric series, the value of the common ratio was frequently found correctly. However, only a minority of students scored the mark in part **(b)(ii)**. The most common incorrect reason for the series not having a sum to infinity was 'r is negative'.

Question 5

Approximately 80% of the students obtained the correct values for the three coefficients in part **(a)**. The errors seen were almost always linked to dealing with the powers of $2x^2$. Almost all students scored the mark in part **(b)**. In part **(c)** it was possible to score 4 of the 6 marks even if using the wrong coefficients from part **(a)**. In part **(c)(i)** most students attempted to write the integrand in a suitable form, although a minority miscopied the coefficient 54 as 5 in the process. For the final accuracy mark examiners expected students to give their final answer with signs and coefficients simplified. This mark could be salvaged if the simplified form appeared before substitution of the limits in part **(c)(ii)**. More so than in previous years, students who had an incorrect answer for **(c)(i)** gave the correct value for the definite integral. Using a calculator to evaluate the definite integral directly gained no credit as the question required the use of 'Hence'.

Question 6

A majority of students scored full marks for this unstructured question. Approximately one-third of the students scored no more than the 1 mark for writing down the equation $100 = 121p + q$. Those students who applied $L = \mathrm{f}(L)$, stated in the specification notes, to get $16 = 16p + q$ usually found the correct value for the fourth term of the sequence. Some students resorted to applying inappropriate formulae for arithmetic or geometric series.

Question 7

Most candidates correctly applied the relevant log law to express the difference of the two logarithms in part **(a)(i)** as a single term. Most candidates could see how their answer to part **(a)(i)** could be used in part **(a)(ii)** those who wrote $-\log 18 + \log(x-1)$ incorrectly as $-\log 18(x-1)$ were limited in the marks they could achieve. A large proportion of those who solved the correct resulting quadratic failed to score the final accuracy mark because they did not reject $x = -2$.
Most candidates scored the mark in part **(b)(i)**. In part **(b)(ii)** a majority of candidates scored at least one mark for either applying a relevant logarithm law correctly or for writing $x^2\sqrt{x}$ as $x^{2.5}$. However, only a small proportion of students could deal correctly with the elimination of the different bases to find the correct value for p.

Question 8

As expected, students generally found part **(a)** difficult. The early common mistake was to divide the left-hand side by $\cos^2\theta$ but not the right-hand side. Students who scored the first M1 for dividing both sides by $\cos^2\theta$ and then writing $9\tan^2\theta - 2\tan\theta - \frac{8}{\cos^2\theta} = 0$, sometimes resorted to crossing out the 9 and the $\cos^2\theta$ to then claim the printed answer to be shown. More able

candidates proceeded in a correct manner to express $\frac{8}{\cos^2\theta}$ as $8+8\tan^2\theta$ and generally then presented a convincing solution. Those who started their solution by writing the given equation as $9\sin^2\theta - 2\sin\theta\cos\theta = 8(\cos^2\theta + \sin^2\theta)$ were generally more successful.
Most students could see how to apply 'Hence' to answer part **(b)** with a majority finding at least two values for $2x$ before dividing by 2. Other than only giving two of the four values, the most common error was to round the four values for $2x$ prematurely which resulted in incorrect rounded values for two of the values of x.

Question 9

Most students correctly stated that the transformation in part **(a)(i)** was a stretch and in part **(a)(ii)** was a translation. The common errors were the y-direction for the stretch and the vector for the translation stated as $\begin{bmatrix}-3\\-15\end{bmatrix}$ instead of $\begin{bmatrix}-3\\0\end{bmatrix}$.

In part **(b)(i)** less than half the students scored the mark for writing $2^{x+3} = 8u$. The most common wrong answer was $2^{x+3} = u+3$. As expected, part **(b)(ii)** was the most demanding part question on the paper with slightly more than 60% of the students unable to score any of the 6 marks available. There were, however, some excellent fully correct solutions seen from students who formed and solved a correct quadratic and then applied logarithm laws to reach the exact value for the gradient of the line AB. The most common incorrect method, after correctly eliminating y, was to write $\log 2^{2x} = \log 2^{x+3} - \log 15$.

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