Examiners' Report

Summer 2014

Pearson Edexcel Advanced Extension Award in Mathematics
(9801/01)

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Advanced Extension Award in Mathematics

Specification 9801/01

General Introduction

The paper proved to have an accessible start with almost all students making good progress with questions 1 to 3 and most students seemed reasonably well prepared for a paper of this standard.

The work on vectors was usually completed quite well and there were aspects of the calculus questions that most students could tackle.

Comments on Individual Questions

Question 1

Most students could find the inverse function successfully in Q01(a) with only a small minority failing to manipulate the logs correctly or confusing f^{-1} with f'. A few used the inverse function to answer Q01(b) but the most popular approach was to write $fg(x)$ as $\ln(2g-5)$ and then equate the two expressions. There were sometimes some algebraic errors here and some failed to simplify their answer.

Question 2

There were a variety of approaches employed to tackle this question. Some divided by $\cos(x)$ to get some $\tan(x)$ terms and occasionally they ended up with a quartic equation in $\tan(x)$ which they could not solve. Those who factorised initially were usually more successful and $\sin x(3\sin x+2)=3\cos x(3\sin x+2)$ was often spotted. Many could then establish the $\tan x = 3$ solution but a large number cancelled the $(3\sin x+2)$ factor and thus "threw away" the other solution. Those that did identify that $\sin x = -\frac{2}{3}$ needed considering, could often reach $\tan x = \pm\frac{2}{\sqrt{5}}$ but failed to consider the restrictions on x to select just the minus case.

Question 3

Most could sketch Q03(a)(i) successfully although some tried to put the minimum on the negative y-axis. The next graph was usually tackled well although a few failed to show the correct shape at $(0, -3)$. Few scored full marks for the final graph. The portion for $x > 0$ was fine but the gradient as the graph approached $(0,-3)$ from the left was rarely equal to zero and some did not show that the curve "kinked" at that point.

Q03(b) was tackled quite well and many students found the two correct equations and were able to solve these to get $x = \pm\sqrt{3}$ and $x = 2\pm\sqrt{7}$ but they often failed to select the appropriate signs. There were some who used their graph from Q03(iii) to establish the $-\sqrt{3}$ root and several fully correct solutions that scored S1 here too.

Question 4

This question was found to be challenging. Few students were comfortable considering the general term of the series and only an able minority progressed beyond substituting $n = -\frac{1}{2}$ and replacing x with $-x$.

Q04(b) was more successfully answered and most were able to take out the 3 correctly although few gave a convincing argument to establish the $\left(\frac{x}{4}\right)^r$ term but many did give the correct expression for q. The form of the required expression $2r(x)^{2r-1}$ was supposed to suggest differentiation but this "hint" was lost on many students and few scored anything in Q04(c) or Q04(d).

Question 5

Apart from those who assumed that the base of the pyramid was $ABCD$ this question was answered well.

In Q05(a) apart from the odd arithmetic or sign error full marks were often seen here.

Most started to find the lengths of their vectors in Q05(b) and many chose 6 as the length of the base but failed to give any proper justification. The fact that AC was perpendicular to CD and that AD was $6\sqrt{2}$ were not mentioned – indeed most chose 6 because it was the shortest length.

In Q05(b)(ii) there was some confusion in choosing the correct angle and many chose the angle between a slanting edge and a side rather than the slanting edge and the diagonal of the base. In Q05(b)(iv) and Q05(c) some tried using parameters x, y and z and often filled a page or more with equations which they rarely were able to resolve. On the other hand some were able to solve Q05(c) very quickly by using the fact that the extra vertex V could be found by using the fact that AV was parallel to BD and therefore $\overrightarrow{OV} = \mathbf{a} + \overrightarrow{BD}$. Again students could score S1 or even S2 here.

Question 6

Q06(i) was not answered well as few students told us the substitution they were using. Those that did give the correct substitution and showed how the limits changed were usually able to complete this part.

In Q06(ii) most could make some progress and p was usually correct. There were few problems in establishing the asymptotes either though some did not realise that m was negative.

In Q06(b) most stated that $r = 4$ and many knew that they needed to use the $R\cos(x-\alpha)$ or $R\sin(x+\theta)$ technique to deal with the remainder of the question. Some failed to use the sec function and lost the last mark in Q06(b). The connection with part Q06(i) was not identified by many students and they simply integrated their expression from Q06(b) between the given limits. Some however tried to use Q06(i) but only changed the integrand from $\sec\left(x-\frac{\pi}{6}\right)$ to $\sec x$ or they changed the limits but not were still using $\sec\left(x-\frac{\pi}{6}\right)$. This latter group could obtain the correct answer because of the symmetry of the curve about $x = \frac{\pi}{6}$ but both cases were treated as having mismatched limits unless this feature was explicitly explained.

Question 7

Q07(a) was answered well although some gave the equation of the tower. Most students were able to explain how the parametric equations could be derived but some thought that the $\pi - \theta$ was an angle and did not state that it was the length of the string from A to G.

In Q07(c) some attempts failed to identify that the function x required use of the product rule but many were able to differentiate correctly and substitute into the given formula. Some identified the appropriate substitution and a few explained that $\sin(\pi - \theta) = \sin\theta$ and that $\cos(\pi - \theta) = -\cos\theta$ but only a very small minority gave a convincing argument to deal with the limits.

Q07(d) required integration by parts and the use of the double angle formula. Some identified one of these ideas but not always both and there were a number of sign erors or missing constants that "disappeared" when the limits were applied. The $\int u \sin u \, \mathrm{d}u$ in the last part was usually correct and often they dealt with $\int u \sin u \cos u \, \mathrm{d}u$ too but fully correct solutions were rare. Many forgot to subtract the area of the tower and others forgot the area of the semi-circle.

Grade Boundaries

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

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