FURTHER MATHEMATICS

Paper 9231/01
Paper 1

General comments

Only the occasional script of outstanding quality and a small number of good quality scripts were received in response to this examination. There were a significant number of very poor scripts. The better candidates presented their work well, while the work of weaker candidates was untidy with many incomplete or deleted attempts at solutions. Many candidates were unable to differentiate or integrate accurately and algebraic technique was often weak. Numerical answers were frequently inaccurate.

There was no evidence to suggest that candidates had any difficulty completing the paper in the time allowed. The vast majority of candidates made substantial attempts at nearly all the questions. Once again there were very few misreads and this year there were few rubric infringements. The occasional candidate, who could not fully attempt either of the two alternatives in the final question, would submit two partial solutions.

It was felt that candidates had been well prepared for all parts of the syllabus and had a sound knowledge of certain areas. Induction, linear spaces and complex numbers, however, still remained problematical for many candidates. Recent improvements in vector work seem to have been maintained.

Comments on specific questions

Question 1

Many candidates were able to gain the first mark by producing the result $S = 2\pi a^2 \int_0^{\sqrt{2}} t\sqrt{4t^2 + 1}\, \mathrm{d}t$. The number of candidates who could successfully perform the integration, either directly, or using a suitable substitution, was disappointingly small. The fact that the answer was given in the question meant that full working was required.

Question 2

There were many complete and accurate answers to this question. Almost all candidates were able to establish the result $\frac{2n+3}{n(n+1)} = \frac{3}{n} - \frac{1}{n+1}$. Many were then able to use the method of differences to show that $\sum_{n=1}^{N} \frac{2n+3}{n(n+1)}\left(\frac{1}{3}\right)^{n+1} = \frac{1}{3} - \frac{1}{(N+1)}\left(\frac{1}{3}\right)^{N+1}$, from which they were able to deduce the sum to infinity correctly.

Answers: $\frac{1}{3} - \frac{1}{3^{N+1}(N+1)}$, $\frac{1}{3}$.