MATHEMATICS

General Certificate of Education (New)

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Advanced Subsidiary/Advanced

PURE MATHEMATICS B – A2 UNIT 3

General comments

This paper proved to be of an appropriate standard and was accessible to the majority of candidates. Many very good solutions were seen to all of the questions. Question 14(b) would seem to be the question that caused the candidates the most difficulties as many did not spot the correct trigonometric substitution, though most candidates did realise that a trigonometric substitution was required. The length of the paper would seem to be about right. I wish the quality of presentation of candidates' solutions could be improved, and I think all my assistant examiners would echo that sentiment.

Comments on individual questions

1. This question provided a good start to the paper. Both available methods were seen equally often and errors were mainly algebraic caused by carelessness.

2. This second accessible question should have thoroughly settled the candidates' examination nerves. Hardly any candidates got this question wrong.

3. Most candidates coped with this question well and the points were marked in clearly. In part (b), a minority of candidates did not realise that the graph is now a negative quadratic curve and got the wrong shape.

4. Candidates are well used to solving trigonometric equations of this type and this particular one is a simple example of its type. Not many candidates had difficulties.

5. As the form of the partial fractions was given in part (a) of the question, candidates were well able to find the required constants, either by substituting appropriate values for x, or by comparing coefficients. The integration was also reasonably well done with very few candidates missing the $\ln$ terms. There were some errors seen, particularly with candidates forgetting the minus sign when integrating $4\left(x-4\right)^{-2}$.

6. The responses to this question were a little disappointing. Some candidates were not able to deal efficiently with the negative fractional index in the binomial expansion. Some candidates substituted $x=\dfrac{1}{13}$ into the expanded side of the equation only and were therefore not able to find the required approximate value for $\sqrt{13}$.

7. This was a generally well done question with some candidates substituting the incorrect expression, $1+\dfrac{x^2}{2}$, for $\cos x$, which, sadly, lost them all the available marks in this question.

8. This proved to be a very simple question for many candidates. Some did the question without using the usual equations for an arithmetic progression. Quite a few solutions were seen where there was no working at all. Almost all but the weakest candidates obtained full marks in this question.

9. This question proved to be reasonably challenging. In part (a), many candidates made perfectly correct statements about the divergence of the series when $|r| > 1$, but omitted to say anything about its convergence. However, it is statements about the convergence that carried the mark. In part (b), candidates were generally not able to explain why the series W is a geometric one. However, they simply assumed that the series is geometric and were able to form the correct equation from the information provided in the question and went on to find the value of r correctly. In part (c), candidates who realised that the sum to 20 terms of a geometric series was required usually went on to obtain the correct answer. A proportion of these candidates were out by a factor of (1.03).

10. Candidates did not find this question easy. In part (a), many candidates realised that θ needed to be eliminated, but they used a variety of inappropriate methods where θ was eliminated but where there were still trigonometric functions present in the equation. Part (b) was reasonably well done with all the methods equally used by the candidates, including first finding the coordinates of *P* and *Q* and then verifying that these points lie on the line. In part (c), many candidates did not know how to deal with an infinite gradient and simply assumed that the gradient was 0.

11. A lot of candidates were able to gain the first 3 marks, but they were not able to gain the last mark. Although they all knew that there had to be a contradiction, many were not able to say where the contradiction occurred.

12. Part (a) was not well done giving the impression that the work on functions was not generally well understood. Part (b) had better quality responses except for the required sketch of the graph. Many sketches were very carelessly drawn. Asymptotes were not generally drawn in the sketch. These were required as no marks were awarded for a graph without its accompanying asymptotes.

13. Parts (a) and (b) of this question were well done. In part (c), some very strange answers were seen. Many candidates seemed to have forgotten the 17.

14. Part (a) was well done though solutions were riddled with careless mistakes. Part (b) depended on candidates spotting the correct substitution, either $2\sin\theta$ or $2\cos\theta$. Many candidates tried $\sin\theta$ or $\cos\theta$ which was not helpful. Candidates who presented perfectly correct answers, presumably obtained from their calculators, without any supporting working were awarded no marks at all.

15. Some candidates did not manage to separate the variables correctly. This was a costly mistake as all available marks were lost.

16. This question is similar to the ones that appeared in the 'C' papers in the legacy qualification and are therefore generally well done by many candidates. Errors were usually careless algebraic ones or with the arithmetic when calculating the gradient of the tangent.

17. This last question also did not cause many difficulties. Some candidates were not able to draw a convincing graph. Usually, the cosine curve was correct, but the point of intersection with the straight line was not between 0 and $\frac{\pi}{2}$. This usually lost candidates the first mark in the question. The Newton-Raphson method seemed to be well understood.