MATHEMATICS

General Certificate of Education (New)

Summer 2019

Advanced Subsidiary/Advanced

PURE MATHEMATICS A – AS UNIT 1

General Comments

This paper seems to be comparable to last year's paper in length and difficulty. Candidates generally seemed to be reasonably well prepared. Generally speaking, the topics which were in the legacy specification were well done. However, there were still some topics that many candidates found difficult, such as logarithms and exponentials (question 10). The responses to questions 6 and 11, which are on new topics, were disappointing. Many candidates made no attempt at all on question 11. Question 15, on increasing functions, required knowledge from more than one topic and was probably the least well done question on the paper.

The majority of candidates adapted reasonably well to the more challenging problem-solving questions, although these types of questions proved too difficult for the weaker candidates, of which there were many.

Many candidates' responses would benefit from a good diagram. The general reluctance amongst candidates to spend time drawing good and properly labelled diagrams is noticeable. The lack of a diagram often leads to errors in the solutions as some facts, which become obvious with a diagram, escape the candidates' notice.

Comments on individual questions/sections

Q.1 This question provided a good start to the paper. Some candidates lost marks unnecessarily by not showing their method for solving the resulting quadratic equation, presumably they solved it using their calculators.

Q.2 A similar question on last year's paper was very poorly answered, with hardly any correct answers seen. However, this question was much better received, though many candidates were not able to collect together the x terms and to the identify the a, b and c correctly in order to write down the discriminant. Some candidates found the presence of the unknown constant k a problem. Many candidates who correctly calculated the critical values were not able to find the correct inequalities and gain the final two marks.

Q.3 This topic was well known by candidates and so the approach used to answer the question was usually correct and there were very few careless errors (usually a sign error) in factorisation.

Q.4 This question was well done, except for the last part, which would have benefited from a good diagram. Many candidates either used the incorrect triangle, or put the right angle in the wrong place.

Q.5 Some candidates misunderstood the question and only considered $n = 2, 3$ instead of $n = 1, 2, 3, 4$. That, and forgetting to mention that the resulting numbers are prime numbers, were probably the only errors seen.

Q.6 This was one of the poorer answered question on the paper. Candidates did not seem to understand vectors well. This was disappointing as part (*a*) only required very basic knowledge of vectors.

Q.7 Part (*a*) was well done. In part (*b*), the numerical terms were often correctly dealt with, probably with the aid of the calculator. However, surprisingly many candidates were not able to simplify $\sqrt{b^2}$, and sometimes candidates were clearly very careless with their presentation as it was sometimes not easy to distinguish whether the candidate had written $\sqrt{12b^2}$ or $\sqrt{12}b^2$.

Q.8 In part (*a*), owing to carelessness with details, the last two marks were often lost. These two marks were only awarded for perfect presentation. Part (*b*) involved some simple differentiation and substitution and was well done.

Q.9 The algebra needed to deal with circles is generally well understood by candidates. Thus, this question was reasonably well done except for part (*d*). Candidates generally did not draw a diagram showing the circle and all the points clearly labelled. Consequently the position of the right angle was often incorrect, so that the diameter was often incorrectly used to find the area of the triangle required.

Q.10 Part (*a*) was probably the worst answered question on the paper. Many candidates attempted to take logs, which was one of the correct approaches. Unfortunately, although the power law was correctly applied, the addition law was not. This resulted in a pair of equations which were not linear and their solution proved beyond the capabilities of the candidates. Some nice solutions were seen, though not many. The responses to part (*b*) were as expected, with many candidates gaining the two B marks and then making no further progress.

Q.11 As in question 10, candidates knew that they needed to take logs and, here, it was both the addition law and the power law that was applied incorrectly. There were large numbers of 'no attempts' on this question.

Q.12 This was a reasonably well-done question, though many candidates thought there were eight terms instead of nine in the series. Often the incorrect term was picked in part (*c*). More disappointingly, many candidates found the entire series in order to pick the required answers, which must have wasted quite a bit of valuable examination time. Some candidates wrote out the complete Pascal triangle to find the required ${}^{8}\mathrm{C}_{r}$, instead of using the formula.

Q.13 Questions of this type often appeared in the legacy papers and were well done. As expected, this question was also well done generally, with very few errors, except careless ones, seen.

Q.14 Sine and cosine rules seem to be generally well known by candidates. To do this question efficiently, both rules were required. Errors were of two types: some candidates knew the sine rule, but not the cosine rule, whilst others knew the cosine rule, but not the sine rule.

Q.15 Responses to this question were disappointing. Many candidates knew that the crux of the matter was to show that the first derivative was always positive. There were a variety of methods available. Since the function was only a quadratic, candidates could find its minimum, either by means of the second derivative, or by completing the square. Alternatively, they could calculate the discriminant, which turned out to be negative, showing that the curve was either completely above, or completely below the x-axis, and then consider a single point on the curve.

Q.16 This question was reasonably well done. The most common error was integrating from -1 to -2, rather than the correct -2 to -1, resulting in a sign error in the answer to the integral.

Summary of key points

Generally speaking, the presentation of solutions by candidates is poor. A little more care should be taken with handwriting. It is not often possible to tell the difference between 5s and 8s, for example. This has an impact on the accuracy of solutions, as sometimes the candidates cannot read their own handwriting, resulting in transcription errors.

Candidates should be encouraged to draw clearly labelled and complete diagrams, wherever appropriate. The time spent on this is often well rewarded.

Standard proofs should be learnt with more care and attention to detail. For example, in the question on differentiation from first principles, it would be nice to see rather more perfect solutions.