

**MATHEMATICS**  
**General Certificate of Education**  
**Summer 2023**  
**Advanced Subsidiary/Advanced**  
**PURE MATHEMATICS A – AS UNIT 1**

**Overview of the Unit**

This paper seemed to have been well received by candidates. Excellent solutions were seen to all 14 questions. Even for question 7, which proved difficult for a number of candidates, many excellent full-mark solutions were seen.

The general opinion among examiners was that this paper was relatively straightforward, with very few marks that were only obtainable by the most able candidates. This was supported by the better performance generally by candidates, compared to the summer 2022 paper.

All topics seemed to have been reasonably well understood by many candidates. Generally speaking, candidates are weak at sketching graphs, even very standard ones. The use of graphical calculators does not seem to be widespread. In addition, many candidates' performance could well be improved if they took the time to draw reasonably accurate diagrams. A relatively accurate diagram would enhance their understanding of the requirements of the question.

**Comments on individual questions/sections**

- Q.1 This question was well done by the majority of candidates. Disappointingly, in part (a), far too many candidates failed to bracket the term  $(-3x)^2$  and obtained the incorrect third term. Some candidates lost the negative sign all together.
- Q.3 This question was well done until part (d). Often the absence of a reasonably accurate diagram meant that candidates identified the wrong diameter for the circle. Spending a little time to draw an accurate diagram is probably time well spent.
- Q.7 For part (a) of this question, there were two methods that could be used. Both methods involved an initial step of equating the two given equations. Candidates could then either find the discriminant, or equate the gradient function to  $m$ , the gradient of the given line. Although the second method is far easier than the first method, the most popular method was the discriminant approach. It was unusual to see a completely correct solution. Many candidates were unable to answer (i), but they were able to use the equation given in (i) to write a completely correct answer to (ii); or they were able to answer (i) well, but they failed to answer (ii). In many solutions, work appropriate to (i) was seen in (ii).

Inexplicably, solutions for part (b) were disappointing. Many candidates did not attempt part (b), or, if they did, they were unable to determine the correct regions.

Q.9 Part (a) was a question on differentiation from first principles. As this was a proof question, it was marked very strictly. Most candidates did not gain the final two quality marks, as often, there were some errors in their presentation, e.g. incorrect notation.

In (b)(ii), candidates needed to solve the inequality  $6x^{\frac{1}{2}} - 3x^{-\frac{3}{2}} > 0$ . The algebraic manipulation required with the fractional indices proved too difficult for most candidates and there were very few correct solutions seen.

Q.10 In part (c), the usual errors were seen when applying the laws of logarithms. In particular, when candidates attempted to combine the second and third terms, they failed to spot the negative sign in front of the second term and used the addition law rather than the subtraction law. Many candidates who got all the laws correct were unable to deal with  $\log_3 81$ , not realising that this could be evaluated using a calculator. Also, many candidates failed to solve the resulting simple log equation  $\log_7 x^2 = 4$ , which was disappointing.

Q.11 In part (a), some very strange and incorrect graphs were seen. Candidates often lost the curve in the second quadrant. Otherwise, this was a generally well-done question.

In part (b), most candidates correctly translated their graph to the right. Some forgot to indicate how many units to the right and candidates also frequently lost the B1 mark for stating the point where the curve crossed the  $y$ -axis.

In part (c), some candidates' sketches were not sufficiently accurate and, as a result, they missed one of the points of intersection in the first quadrant.

Q.12 It was very disappointing that candidates were unable to recall the definition of a unit vector, particularly since this also featured in the summer 2022 Unit 1 paper. However, this did not prevent candidates from accessing subsequent parts of the question, and it was pleasing to see that part (c) was generally well done.

Q.13 This question was generally well done. Although candidates were able to apply the correct method in answering the question, they often lost marks due to arithmetic errors.

Q.14 Very few candidates were able to successfully answer part (a), as many candidates did not seem to understand what was required.

Part (b) was generally well done by candidates who realised that  $A = 5$ . A few were able to derive that from the information given in the question. Many candidates lost the final mark for failing to subtract 4 hours from their value of  $t$ , obtained for a concentration of 0.6. However, many candidates who did not realise that  $A$  was the initial concentration were not able to make progress on this question.

Q.2, Q.4, Q.5, Q.6, Q.8 – There were no areas to highlight on these questions.