FURTHER MATHEMATICS

General Certificate of Education (New)

Summer 2018

Advanced Subsidiary/Advanced

FURTHER PURE MATHEMATICS A- AS UNIT 1

General comments

The candidates performed less well than expected and there were few excellent scripts. Many candidates began well before struggling with the middle section of the paper, only to collect many marks at the end of the paper.

Comments on Individual Questions

1. This question was answered well by many candidates. However, numerous candidates believed there was no inverse of $\mathbf{B}$ because the bottom-left and top-right values were equal. Some candidates ignored the 'hence' in part (*b*) and found simultaneous equations to solve, losing marks.

2. Questions on induction have appeared in the legacy qualification so it was disappointing that rarely were full marks awarded for this question. Candidates who undertook the proof by induction method often omitted elements and their conclusions were also lacking in detail. However, there were many candidates who used the expressions for $\sum r^2$ and $\sum r$ to derive the given result rather than provide a proof by induction.

3. In part (*a*), many candidates derived the quadratic equation satisfied by the values given in the question and then proceeded to solve correctly for α, β and γ, although some candidates cancelled through by x and as a result lost the value of 0 as one of their answers. Those candidates who realised one root must be 0 given $\alpha\beta\gamma = 0$, normally found the remaining roots quickly. Part (*b*) was answered well if part (*a*) was completed, although some errors with signs appeared when forming the equation.

4. This question was answered poorly with many candidates unaware that θ should be in radians and that the complex number was situated in the second quadrant of an Argand diagram. Many candidates began the question again with the conjugate rather than realising the modulus would be equal and the argument reflected in the Real axis. Few candidates seemed to know the relationship between moduli and arguments when multiplying complex numbers in part (*b*).

5. Part (*a*) was completed well, although some candidates used partial fractions to work in reverse despite partial fractions being outside of the specification – the mark was awarded if the method was fully correct. Part (*b*) was often started well with candidates beginning with values for $r = 2$, although some began with $r = 1$ and subsequently encountered difficulties. However, poor algebraic skills often resulted in errors, particularly with combining fractions and negative signs. Whilst part (*c*) was often answered well, some candidates stated that $\frac{4}{0} = \infty$, which was penalised.

6. Part (*a*) was often awarded 2 marks rather than the 3 available as candidates did not show a method for calculating $(1-2\mathrm{i})^3$ – it is imperative that sufficient mathematical working be shown to gain credit. In part (*b*), the majority of candidates noted the conjugate as another root and the candidates who found the final root most successfully were those who used the method of roots of polynomials rather than finding a quadratic factor from the complex roots.

7. Many candidates answered part (*a*) well. However, few noted that the locus was a perpendicular bisector between the points (4, 1) and (-2, 0). The responses seen most often pertained to the gradient and intercept of the line derived.

8. This question was answered very well, proving to be a boost to candidates' marks. However, some candidates multiplied in the wrong direction in part (*a*) and others were unable to identify T^{-1} having derived the identity matrix correctly.

9. Parts (*a*)(i) and (*b*) were answered very well, boosting candidates marks further. However, there were many errors in writing the Cartesian form of the equation of the line in part (*a*)(ii). Part (*c*) was answered very poorly and candidates seemed unsure of the method of finding a common perpendicular vector, often trying to use $|\mathbf{a}||\mathbf{b}|\cos\theta = \mathbf{a}.\mathbf{b}$.