L-Università ta' Malta

MATSEC Examinations Board

Examiners' Report

IM Pure Mathematics

First Session 2025

Summary of Results

Grade	A	B	C	D	E	F	Abs	Total
Number	48	50	95	51	48	140	90	522
%	9.2	9.6	18.2	9.8	9.2	26.8	17.2	100

Grade	A - C	A - E	F
Number	193	292	140
%	37.0	56.0	26.8

Comments on Candidates' Performance

Question 1. Practically all candidates attempted this question, and most of them answered the majority of it correctly. A considerable number mistakenly believed that dividing $f(x)$ by $x+1$ constituted the required proof. Most candidates correctly obtained the partial fractions by substituting selected values of x, while a few used the method of equating coefficients. Only a small number of candidates managed to arrive at the given value of the integral: some did not use the partial fractions they had found; others made careless errors when integrating the partial fractions; and many confused the rules of logarithms.

Question 2. A large number of candidates did not realise that they needed to take logarithms in order to produce a straight-line graph. As a result, many ended up with a curve- or worse, a segmented curve. Instead of using the graph, as instructed in the final part of the question, to determine the two unknowns, some candidates chose to use given values to form two simultaneous equations and solved them algebraically.

Question 3. The presence of surds in the coefficients of the quadratic equation proved challenging, and most candidates did not simplify correctly the term required to complete the square. In part (b) very few candidates recognised that the given trigonometric equation was the same as in part (a). Instead, many attempted to apply trigonometric identities without success. Only a handful made correct use of part (a), and very few among them found all possible solutions. The inclusion of a double angle added further difficulty.

Question 4. In part (a) not more than a handful managed to open up the bracket correctly and obtain the derivative. Most of them either opened up the bracket wrongly and consequently obtained the wrong derivative or differentiated it as a function of a function and then simplified it in the wrong way. Overall, candidates demonstrated weak algebraic manipulation skills. Part (b) proved to be a challenging question. Very few candidates managed to work through it correctly from start to finish. Most simply stated the chain rule and attempted to differentiate, but without a clear or accurate method.

Question 5. Most candidates found part (a) relatively straightforward, although quite a few relied on trial and error to solve the equations they formulated. In part(b), those who applied the correct formula for the sum of a series generally arrived at the correct answer; however, some candidates either failed to solve the resulting quadratic equation correctly or used an incorrect formula for the sum of an arithmetic progression. In part (c), the most common error involved poor manipulation of fractions when attempting to find the sum to infinity of a geometric progression. Additionally, many candidates were unaware of the conditions under which such a sum exists.

Question 6. In part (a), a considerable number of candidates understood the steps required to locate and classify the stationary points, however, many struggled with basic algebraic manipulation of simple expressions and equations. In part (b), most candidates correctly recognized the need to separate the variables and did so successfully. The main difficulty arose in integrating $f(y)$. Some candidates noticed that the numerator of $f(y)$ was the derivative of the denominator and proceeded efficiently. In contrast, a significant number opted to express $f(y)$ in partial fractions, which was an unnecessarily longer approach that led to more errors. Very few candidates were able to obtain the correct answer in its simplest form.

Question 7. Many candidates struggled with finding the area of the segment in part (a); while many of those who correctly found the area of the sector, then failed to subtract the area of the triangle. A few also confused radians and degrees in their calculations, resulting in incorrect answers. In part (b), the majority had no difficulty finding the points of intersection between the two graphs, although some mistakenly found the points where each graph intersected the x-axis instead. For part (c), most candidates integrated correctly and were able to obtain the correct answer, but some made errors by using incorrect limits or by making mistakes in substitution.

Question 8. In part (a), most candidates found the first question easy, although some left their answer simply as “16!” without further evaluation. In part (b), many struggled to determine the number of arrangements where the girls sat next to each other, and several failed to use their previous answer to calculate the required probability. The majority of candidates obtained the correct answer in part (c). In part (d), many had no difficulty computing ${}^{6}C_{4}$ but quite a few stopped at that step and did not proceed to calculate the resulting probability.

Question 9. In part (a), most candidates calculated the gradients of AB and AC without difficulty; however, many did not use the product of the gradients to prove that the triangle is right-angled. Instead, some applied the formula for the tangent of the angle between two lines or used Pythagoras’ theorem after determining the lengths of the triangle’s sides. In part (b), those who correctly quoted the distance formula generally had no trouble calculating the side lengths and showing that the triangle is isosceles. In part (c), while many candidates correctly applied the formula for perpendicular distance, a significant number used the equation of the wrong line in their calculations.

Question 10. In part (a)(i), not all candidates were aware that a matrix has no inverse when its determinant is zero, and as a result, some left this part unanswered. In part (a)(ii), while the majority knew how to find the inverse of a matrix, some calculated the determinant incorrectly or forgot to divide by it. In part (b), the most common mistake when expanding $(1-2x)^n$ was writing x^k instead of $(-2x)^k$, leading to an incorrect equation. Others successfully used Pascal's triangle to obtain the correct expansion. Some candidates managed to derive the ensuing quadratic equation but were unable to solve it correctly.