

AN ROINN OIDEACHAIS

(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1956.

MATHEMATICS—Algebra—Pass.

MONDAY, 11th JUNE.—MORNING 10 TO 12.30.

All questions to be answered.

Mathematical Tables may be obtained from the Superintendent

1. Solve the equations
$$\begin{cases} x^2 + xy + y^2 = 3, \\ x^2 - xy + y^2 = 7. \end{cases}$$
 [25 marks.]
2. (a) $2x^3 + px^2 - x - q$ is exactly divisible by $x^2 - x - 2$. Find p and q .
(b) Factorise $2x^2 + x(a-5) - a^2 + 4a - 3$. [25 marks.]
3. The length of a rectangle exceeds its breadth by 24 feet and the square on the diagonal exceeds the area of the rectangle by 1108 square feet. Find the dimensions of the rectangle. [30 marks.]
4. (a) The eleventh term of an arithmetic series is 25 and the twenty-first term is 10. Find the first term and the common difference. How many terms of the series are positive?
(b) Show that the sum to n terms of the geometric series $1 + 1\frac{1}{2} + 2\frac{1}{4} + 3\frac{3}{8} + \dots$ is less than three times the n th term. [30 marks.]
5. (a) If $x = \log_b a$ and $y = \log_b c$, prove that $a^y = c^x$.
(b) Solve the equation $\log_{10}(x^2 - x + 4)^3 = 3$.
(c) Without using tables, simplify $\frac{1}{\sqrt{12}} \times (18)^{\frac{3}{2}} \times (54)^{-\frac{1}{2}}$. [30 marks.]

6. Solve the equation $x^4 - 14x^2 + 9 = 0$.
Give your answers in simplest surd form.

[30 marks.]

7. Draw the graph of the function $\frac{1}{3}(x^3 - 10x)$ for values of x from -4 to $+4$. For what range of values of x in this interval is the function (i) negative and increasing, (ii) positive and decreasing?

Use the graph to solve the equation $x^3 - 10x - 3 = 0$.

[30 marks.]