AN ROINN OIDEACHAIS
(Department of Education).

BRAINSE AN MHEÁN-OIDEACHAIS
(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1932.

PASS.

MATHEMATICS (I).

MONDAY, 6th JUNE.—Afternoon, 3.30 to 6 p.m.

Seven questions may be answered.   10 (*a*) or 10 (*b*) may be answered, but not both.   All questions carry equal marks.

Mathematical Tables may be obtained from the Superintendent.

1. Find all the factors of $x^4 - x^2 - 240$.   By using the method of " completing the square " or otherwise factorize $4x^2 + 18x - 972$.

2. Solve the equations :

   (i) $x + \sqrt{x} = 56$.

   (ii) $\dfrac{x^2 - 1}{x} - \dfrac{x}{x^2 - 1} = \dfrac{5}{6}$. $\left(\text{Put } \dfrac{x^2 - 1}{x} = y \right)$.

3. Prove that in the quadratic equation $x^2 + px + q = 0$ the sum of the roots is equal to $-p$ and the product of the roots is equal to q.

   Form the quadratic equation whose roots are the cubes of the roots of $x^2 - x - 3 = 0$.

4. What can be stated about the value of x for which the expression $2x^2 - 11x + 12$ is (i) zero, (ii) positive, (iii) negative ?   Find also the least value of the expression.

5. Prove the formula for the sum of n terms of a Geometrical Progression whose first term is a and common ratio r.

   Find the least value of n for which the sum of n terms of the series $1, 3, 3^2, \ldots$ is greater than 100,000.

6. If $x - 1$ and $x + 2$ are factors of $2x^4 - x^3 + px^2 + qx + 4$, find the values of p and q and find the remaining factors.

7. An Arithmetical Progression consisting of 19 terms has 50 as its middle term : find the sum of the series.   If the 14th term is 56, what is the first term ?

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8. A man's income is £200 for the first year and increases each year by £20. His expenditure is £180 for the first year and increases each year by 10% of the expenditure for the previous year. Prove that after 11 years his total expenditure will have exceeded his total income.

9. Draw on as large a scale as convenient the graph of $y=(1\cdot5)^x$ for values of x between 0 and 1.

Use the graph to find the value of $\log_{1\cdot5}1\cdot2$ and verify by calculation.

10a. Write out the first 4 terms of the expansion of $(1+x)^n$ by the Binomial Theorem.

Evaluate $(1\cdot01)^{10}-(\cdot99)^{10}$ to 5 decimal places.

Or,

10b. Find the L.C.M. of x^3+6x^2-x-30 and $x^3+3x^2-4x-12$.

Show that $a-b$ is a factor of $a^4(b-c)+b^4(c-a)+c^4(a-b)$ and find the other factors.