AN ROINN OIDEACHAIS

INTERMEDIATE CERTIFICATE EXAMINATION, 1964.

MATHEMATICS (Algebra).

TUESDAY, 9th JUNE. — Morning, 10 to 12.30.

ALL questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

1. (*i*) Solve the equation:

$$\tfrac{1}{3}(3 - x) - \tfrac{1}{7}(x - 3) = 1.$$

(*ii*) If a is a whole number, such that $5a - 4$ is greater than 1 and less than 21, find the values of a.

(28 marks.)

2. 1,010 tickets were sold, some at 1*s*. 6*d*. each and the remainder at 2*s*. 6*d*. each. The amount received for tickets sold at 1*s*. 6*d*. each was less by £5 1*s*. than the amount received for those sold at 2*s*. 6*d*. each. How many tickets at 1*s*. 6*d*. each were sold ?

(28 marks.)

3. (*i*) Solve the equation:

$$(2x + 1)^2 = (x - 2)^2.$$

(*ii*) Find, correct to two decimal places, the values of x that satisfy the equation $4x^2 + 4x = 1$.

(28 marks.)

4. (*a*) Factorise:

(*i*) $a^2 - 25a + 24$;

(*ii*) $x^2 - y^2 - x + y$.

(*b*) The expression $x^3 - 2px^2 - (4p + 1)x + 6$ has $(x - p)$ as a factor for certain values of p. Find those values of p.

(28 marks.)

5. (*i*) Simplify $\dfrac{1}{1 + \sqrt{2}}$ by rationalising the denominator.

(*ii*) If $x = 1 + \sqrt{2}$ and $xy = 1$, find the value of $x + y$ and of $x^3 + y^3$.

(*iii*) If $p^2 = 2p + 1$, show that $p^3 = 5p + 2$.

(28 marks.)

6. (*i*) Prove that $\log_a MN = \log_a M + \log_a N$.

(*ii*) Show, without using the Tables, that $\log_4 6 + \log_4 \sqrt{8} + \log_4 \frac{2}{3} = \frac{7}{4}$.

(*iii*) If $x^2 + 1 = 3x$, show that $\log(x + 1) - \frac{1}{2}\log x = \frac{1}{2}\log 5$.

(30 marks.)

7. Draw a graph of $2x^2 - 4x - 4 (= y)$ for values of x from -2 to $+4$.

Find from your graph, as accurately as you can,

(*i*) the value of y when $x = 3{\cdot}5$, and what other value of x gives that same value to y;

(*ii*) the roots of the equations $x^2 - 2x - 2 = 0$, $x^2 - 2x - 1 = 0$.

(30 marks.)