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(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1953.

MATHEMATICS—Algebra—Pass.

MONDAY, 15th JUNE.—MORNING, 10 TO 12.30.

All questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

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1. Solve the simultaneous equations

$$\left.\begin{aligned} x^2-2x+4xy+3y^2&=3 \\ 2x+3y&=5 \end{aligned}\right\}$$

for x and y.

[28 marks.]

2. In an A.P. the 5th term is 14 and the sum of the first 10 terms is 155. Find the first term, the common difference, and the nth term of this progression.

Which term of the progression is equal to 134 ? Which term is nearest to 235 ?

[28 marks.]

3. (*a*) Show, by using the Remainder Theorem, that $(x+1)$ is a factor of $2x^3-9x^2+4x+15$, and find the other factors of the expression.

(*b*) Factorise the following expressions fully :

(i) $x^2-xy-6y^2+3x-9y$;

(ii) $(a+b-c)^3-a^3-b^3+c^3$.

[28 marks.]

4. Express $\sqrt{14-4\sqrt{6}}$ in the form $\sqrt{a}-\sqrt{b}$.

Find the value of c if $x=14-4\sqrt{6}$ is one root of the equation

$$\sqrt{x}+\frac{10}{\sqrt{x}}=c.$$

What is the other root of this equation ?

[28 marks.]

5. In a G.P. the sum of the first and second terms is 2, and the sum of the first and third terms is 5. Find the first term, the common ratio and the nth term of each of the two series which satisfy these conditions.

Find an expression for the sum of the first 10 terms in each case and show that for one of the series the sum is approximately equal to $2\frac{2}{3}$.

[28 marks.]

6. Prove that $\log_n M = \frac{\log_a M}{\log_a n}$.

Find the value of (i) $\log_2 1{\cdot}4$, (ii) $\log_3 0{\cdot}35$, giving the answer correct to two places of decimals in each case.

[30 marks.]

7. Draw the graph of $x^3 - 6x + 3 [= y]$ for values of x from $x = -3$ to $x = +3$.

Find from your graph, as accurately as you can, the roots of the equations (i) $x^3 - 6x + 3 = 0$; (ii) $x^3 - 6x - 3 = 0$.

Write a short account of how the function $x^3 - 6x + 3$ varies in value and in sign as the value of x varies from -3 to $+3$.

[30 marks.]