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(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1958.

MATHEMATICS—Algebra—Pass.

MONDAY, 16th JUNE.—MORNING 10 TO 12.30.

All questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

1. Solve each of the following equations, giving the answers correct to two places of decimals :—

(i) $5x^2 - 11x + 3 = 0.$

(ii) $5 \left(\frac{3x-1}{2} \right)^2 - 11 \left(\frac{3x-1}{2} \right) + 3 = 0.$

[25 marks.]

2. (i) Show that $(x-2)$ is a factor of $2x^3 + x^2 - 13x + 6$ and find the other factors.

(ii) Factorise $x^2 + 5x - (a^2 + a - 6).$

[25 marks.]

3. The third term of an arithmetical progression is 5 and the seventh term is 11 : find the sum of the first fifteen terms of the progression.

In a certain arithmetical progression the sum of the first nine terms is 135 while the product of the fourth term and the eighth term is 300 : find the first term and the common difference.

[30 marks.]

4. If $y = ax$, show that $x^2 + 4xy - y^2 = x^2(1 + 4a - a^2)$ and that $x^2 - 5xy + 2y^2 = x^2(1 - 5a + 2a^2).$

Hence, or otherwise, solve the simultaneous equations

$$\left. \begin{aligned} x^2 + 4xy - y^2 &= 20 \\ x^2 - 5xy + 2y^2 &= -4 \end{aligned} \right\}$$

[30 marks.]

5. Prove the formula for the sum to n terms of a geometrical progression.

Every year for ten successive years a man borrowed a hundred pounds, at 5% per annum compound interest: how much did he owe in all just after he had borrowed the tenth hundred?

[Take $(1.05)^{10}=1.629$.]

[30 marks.]

6. Prove that $\log \frac{m}{n} = \log m - \log n$.

Find, as accurately as you can, the values of x and y which satisfy the simultaneous equations

$$\left. \begin{array}{l} x - y = 2 \\ \log_{10} x - \log_{10} y = 0.2553 \end{array} \right\}$$

[30 marks.]

7. Draw a graph of the function $x^3 - 6x + 3$ for values of x from -3 to $+3$.

Find from your graph, as accurately as you can, (a) the roots of the equations (i) $x^3 - 6x + 3 = 0$, (ii) $x^3 - 6x = 1$; (b) the range of values of x for which the function $x^3 - 6x + 3$ is decreasing as x is increasing.

[30 marks.]