AN ROINN OIDEACHAIS

(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1950.

MATHEMATICS—Algebra—Pass.

TUESDAY, 13*th JUNE*.—Morning 10 to 12.30.

Six questions may be answered.

All questions are of equal value.

Mathematical Tables may be obtained from the Superintendent.

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1. Find the values of x and y which satisfy the simultaneous equations :

$$\left.\begin{array}{l} x^2+2y^2-7x+3y=2 \\ 2x-y \ =4 \end{array}\right\}$$

2. Prove that $(2x-1)$ is a factor of the expression $6x^3+5x^2-34x+15$ and find the other factors.

Hence, or otherwise, find the factors of
$$6(3y-1)^3+5(3y-1)^2-34(3y-1)+15.$$

3. Solve the equation
$$\sqrt{7-x}-2\sqrt{2x+5}=\sqrt{3x+7},$$
and test your solutions.

Or,

3. Express in simplest surd form the square root of $30-12\sqrt{6}$.

Simplify $[30-12\sqrt{6}]^{-\frac{1}{2}}$ and calculate its value, correct to *three* significant figures.

4. Find the value of k so that $4x^2-12x+k$ may be a perfect square. Find the minimum value of $4x^2-12x+20$.

Or,

4. If $x+\dfrac{1}{x}=y$, express $x^2+\dfrac{1}{x^2}$ and $x^3-\dfrac{1}{x^3}$ in terms of y.

5. The 20th term of an Arithmetical Progression is 50 and the 100th term is 290. Find

    (i) the first term and the common difference,

    (ii) how many of the terms are each less than 100,

    (iii) the sum of the first 80 terms.

6. (*a*) Prove the formula for the sum of *n* terms of a Geometrical Progression.

(*b*) The sum of the first two terms of a Geometrical Progression is 3 and the third term is 4 ; show that the 4th term is either 8 or $-2\frac{2}{3}$.

7. The perimeter of a right-angled triangle is 30 inches and the hypotenuse is 8 inches longer than the shortest side. Find the sides of the triangle and the perpendicular from the right-angle to the hypotenuse.

Or,

7. Using the same axes and the same scales draw graphs of $y=(x-1)(x+2)$ and $y=(x+3)(2-x)$ from $x=-3$ to $x=3$.

Explain how the graphs can be used to find approximately the roots of the equation $x^2+x-4=0$ and from them find the values of the roots as accurately as you can.