AN ROINN OIDEACHAIS

(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1945.

MATHEMATICS—Algebra—Pass.

TUESDAY, 12*th JUNE*.—MORNING 10 TO 12.30.

Seven questions may be answered.

Mathematical Tables may be obtained from the Superintendent.

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1. From the first two of the equations

$$2x+y-z=0$$
$$3x-y+2z=0$$
$$x^2+3z-2y-6=0$$

prove that $x=-y/7=-z/5$ and hence solve the equations.

[28 marks.]

2. Find, in the simplest possible surd form, the roots of the equation

$$x^2-2(\sqrt{3}+1)x=13(3-2\sqrt{3}).$$

[Hint. Complete the square on the left-hand side.]

[28 marks.]

3. Solve the equations

(i) $x+y=13/12$

$1/x+1/y=4\frac{1}{3}$.

(ii) $\sqrt{4x^2+x+11}-\sqrt{4x^2+x-5}=2$.

[28 marks.]

4. If

$$\frac{3x^3+6x-1}{x^4-1} \equiv \frac{A}{x-1}+\frac{B}{x+1}+\frac{Cx+D}{x^2+1},$$

where A, B, C and D are independent of x, determine these quantities and verify your answer.

[28 marks.]

5. Factorise as completely as possible

(i) $2x^2-3xy-2y^2+7x+11y-15$,

(ii) $2x^3-5x^2+ax+6$.

In the case of (ii) you are given that $x-2$ is a factor and that a is independent of x.

[28 marks.]

6. The fencing enclosing a rectangular field is 42 chains in length. The same length of fencing would enclose another rectangular field 3 chains shorter than the first and of one-fifth greater area. Find the acreage of each field.

(1 chain=22 yards.)

[28 marks.]

7. (i) Use your tables to evaluate $(27{\cdot}3)^{1{\cdot}68}$.

(ii) If $\log_2 3=x$ and $\log_3 5=y$ prove that $\log_{10}2=1/(1+xy)$.

[29 marks.]

8. (i) The nth term in a series is $3n-7$. Find the sum of the series to 15 terms.

(ii) The sum of n terms of a series is $2n^2+n-2$. Write down the first three terms of the series.

[29 marks.]

9. A man saves £60 a year out of his income and at the end of each year invests it at 3 per cent. per annum compound interest. Find, as accurately as your tables will allow, the total of his savings at the end of 15 years.

[29 marks.]

10. Graph the equation

$$y=x\,(x-2)\,(x-3)$$

between $x=-1$ and $x=5$.

Show how you would use this graph to obtain the roots of the equation

$$x(x-2)(x-3)=a,$$

where a is a given number. Show that, according to the value of a, the equation may have three roots or one root, and find roughly the value of a when two of the three roots become equal.

[29 marks.]