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(Department of Education)

LEAVING CERTIFICATE EXAMINATION, 1959.

MATHEMATICS—Algebra—Pass.

MONDAY, 8th JUNE.—MORNING, 10 TO 12.30.

All questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

1. What is an identity ?

Find the values which the coefficients A, B, C, must have if

$A(x-1)(x-2) + B(x-2)(x-3) + C(x-3)(x-4) = x^2 - 2x - 2$   
is to be an identity.

[25 marks.]

2. Solve the simultaneous equations

$$\left. \begin{aligned} x + 2y &= 9 \\ \frac{x}{y+1} + \frac{y}{x+1} &= 2 \end{aligned} \right\}$$

[25 marks.]

3. A clerk is employed at a salary of £310 for the first year and his salary is increased every year by £20. Calculate the total amount he will receive in salary over a period of 20 years.

Another clerk's salary is £215 for the first year. By how much must his salary be increased every year so that he will receive the same total amount in 20 years as the first clerk ?

In how many years will the two clerks have received a total of £9,600 between them ?

[30 marks.]

4. Factorise

(i)  $x^2 - 2xy + y^2 - z^2$ ;

(ii)  $3x^3 - x^2 - 10x + 8$ ;

(iii)  $(7x-3)^2 - 5(7x-3)(3y-5) + 6(3y-5)^2$ .

[30 marks.]

5. (i) If  $y = \frac{3x+1}{2x-1}$ , express  $x$  and  $\frac{x+1}{x+2}$  in terms of  $y$ .

(ii) Write down the values of  $\log_2 64$ ,  $\log_8 16$ ,  $\log_9 \sqrt{3}$ .

If  $\log_6 x = a$  and  $\log_2 y = a$ , show that  $\log_{10} x + \log_{10} y = a$ .

[30 marks.]

6. (i) The second term of a G.P. is 24 and the fifth term is 81.  
Find the first term.

(ii) Find the value of the expression  $x^3 - 7x^2 + 13x + 3$  when  
 $x = 3 + \sqrt{2}$ .

For what other values of  $x$  has the expression the same value?

[30 marks.]

7. Draw a graph of the function  $x^3 - 3x^2 - 3x + 6$  for values of  $x$  from  $-2$  to  $+4$ .

Write an account of how the function varies in sign and in magnitude as the value of  $x$  varies from  $-2$  to  $+4$ .

Using your graph solve the equation  $x^3 - 3x^2 - 3x + 4 = 0$ , as accurately as you can.

[30 marks.]