AN ROINN OIDEACHAIS
(Department of Education).

BRAINNSE AN MHEADHON-OIDEACHAIS
(Secondary Education Branch).

INTERMEDIATE CERTIFICATE EXAMINATION, 1937.

MATHEMATICS (Algebra).

MONDAY, 21st JUNE.—AFTERNOON, 3.30 P.M. TO 6 P.M.

The total number of questions answered should not exceed *seven*.

Mathematical Tables may be obtained from the Superintendent.

1. Assuming that $s=ut-\frac{1}{2}gt^2$, $u=1{,}000$, and $g=32$, find

(i) the value of s when $t=10$,

(ii) the values of t when $s=0$,

(iii) the value of s when $t=\frac{u}{g}$.

[25 marks.]

2. A shopkeeper purchased d dozen eggs at x pence per dozen, $2d$ dozen which were twopence per dozen cheaper and $3d$ dozen which were a penny per dozen dearer than the first lot. He sold them all at a price which left him a profit of p pence per dozen. Find

(i) his total profit in pounds;

(ii) the total cost price in pounds;

(iii) the average cost price (in pence) of the eggs per dozen.

[25 marks.]

3. Solve the equation

$$\frac{3}{3x-2}+\frac{1}{x+2}=\frac{2}{3x-4}$$

and verify your solutions.

[25 marks.]

4. Find a fraction such that if its numerator be increased by 3 and its denominator be diminished by 1 the resulting fraction is equal to $\frac{4}{5}$, while if its numerator be multiplied by 3 and its denominator be increased by 9 the resulting fraction is equal to $\frac{3}{4}$.

[25 marks.]

5. Factorise as fully as possible :

(i) $27a^3-64b^3$,

(ii) $x^2+2xy-3y^2-2xz+2yz$,

(iii) $bc(b-c)+ca(c-a)+ab(a-b)$.

[25 marks.]

6. The perimeter of a rectangle PQRS is 20 inches : draw a graph showing how the area varies as the length of PQ increases from 0 to its greatest possible value.

(Put x=length of PQ and y=area of rectangle).

From your graph find the maximum area of the rectangle and the corresponding value of PQ.

[30 marks.]

7. Solve the equation $x^2+4=6x$. Find the value of the expression $(7x+2)(x^2-6x+4)+10$ when $x=3-\sqrt{5}$.

For what other values of x would the expression have that same value ?

[30 marks.]

8. Prove that $\log_a\frac{M}{N}=\log_a M-\log_a N$.

Find for what value of x the expression $2\log x^2-3\log x$ shall be equal to 1·2.

[30 marks.]

9. Explain the difference between a "conditional equation" and an "identical equation."

If $\frac{A}{2(3x-2)}-\frac{B}{3(x+2)}=\frac{10}{3(3x-2)(x+2)}$ be true for all values of x, what are the values of A and B ?

[30 marks.]

10. Two men, A and B, walked at uniform rates from P to Q and back to P. A started an hour later than B, overtook him when 2 miles from Q, met him again 32 minutes later and reached P when B was 4 miles behind. Find the distance from P to Q.

[30 marks.]