AN ROINN OIDEACHAIS
(Department of Education)

BRAINNSE AN MHEADHON-OIDEACHAIS
(Secondary Education Branch)

INTERMEDIATE CERTIFICATE EXAMINATION, 1936.

MATHEMATICS (Algebra).

MONDAY, 22nd JUNE.—Afternoon, 3.30 P.M. TO 6 P.M.

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

(Candidates should see that answers to questions in excess of *seven* are cancelled.)

Mathematical Tables may be obtained from the Superintendent.

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1. Given that $a = \frac{1}{4}(3x - 1)$ and $2a = \frac{1}{4}(5y + 1)$, express the values of x and y in terms of a.

   Hence show that $12x - 10y = 6$.   [25 marks.]

2. The total wages of 6 men and 10 boys amounted to £27; the wages of 5 men exceeded those of 7 boys by £11. Find the wage of

       (i) one man,   (ii) one boy.

        [25 marks.]

3. Goods bought at £a per ton were sold at b pence per lb. Find in simplest form

       (i) the cost price in pence per lb.

       (ii) the profit in pence per lb.

       (iii) the percentage profit.   [25 marks.]

4. Solve the equation

$$\frac{2}{x-4} - \frac{1}{x+3} = \frac{3}{x+8}$$

   and verify your results by substitution.

        [25 marks.]

5. Factorize
       (i) $a^2 - x^2 + b^2 - y^2 + 2xy - 2ab$.
       (ii) $x^3 - 4x^2 + x + 6$.
       (iii) $(a+b+c)^3 - a^3 - b^3 - c^3$.

        [25 marks.]

6. **Solve** the equation

$$\sqrt{6x-5}-2\sqrt{x-4}=3.$$ [30 marks.]

7. Define '*logarithm of a number* N *to the base* a.' Prove that

$$\log_a\sqrt[x]{N}=\frac{1}{x}\log_a N.$$

Find the value of $\sqrt[5]{5}$ as accurately as your Tables allow.

[30 marks.]

8. B's income is $\frac{7}{10}$ of A's, his expenditure is $\frac{3}{4}$ of A's and his savings are $\frac{1}{2}$ of A's. If each of them spent £30 less B's savings would be $\frac{3}{5}$ of those of A. Find their incomes. [30 marks.]

9. Using the same axes and scales represent the following train journeys graphically :

Station :	Distance from A :	Train Arrived :	Train left
A	—	—	9·20 A.M.
B	35 miles	10·10 A.M.	10·15 A.M.
C	75 miles	11·35 A.M.	—

Train from A to C

Another train left C at 9·45 A.M., did not stop at B and reached A at 11·30 A.M.

From your graphs find :

(i) when, and how far from A, the trains met ;

(ii) at what times they were six miles apart ;

(iii) which part of the journey from A to C was travelled at the greater speed.

[It is assumed that the trains travelled uniformly between stations.]

[30 marks.]

10. Three roads form a triangle whose perimeter is 45 miles. A man finds that by cycling along one side and motoring along the other two he can complete the circuit round the triangle in 2, $2\frac{1}{4}$ or $2\frac{1}{2}$ hrs. according to the side he selects for cycling. If he motors at a speed which exceeds double his cycling speed by six miles per hour, at what speed does he cycle ?

[30 marks.]