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(Department of Education).

BRAINSE AN MHEAN-OIDEACHAIS

(Secondary Education Branch).

INTERMEDIATE CERTIFICATE EXAMINATION, 1932.

MATHEMATICS (I).

MONDAY, 6th JUNE.—AFTERNOON 3.30 P.M. TO 6 P.M.

Each item (a), (b), (c), (d), (e), (f) in Section I. will be counted as a *half-question*. The total number of questions answered should not exceed *seven*, every pair of items from Section I. being counted as a whole question.

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

Mathematical Tables may be obtained from the Superintendent.

SECTION I.

(Each item (a), (b), (c), (d), (e), (f) in this Section carries 13 marks.)

(a) Solve the equation $2.9 + 0.6x = 3.5x - 4.93$. Check your result by substitution.

(b) Given that $s = \frac{1}{2}gt^2$, express t in terms of s and g . Find, correct to two significant figures, the values of t when $g = 32$, $s = 350$.

(c) Show that $(a-b)$ is a factor of $a^3 - 73ab^2 + 72b^3$ and find the other factors.

(d) Express $\frac{3-x}{1-3x} - \frac{3+x}{1+3x} - \frac{1-16x}{9x^2-1}$ as a single fraction in simplest form.

(e) The weekly wages of 3 men and 4 boys amount to £13 10s., and the wages of 5 men and 2 boys amount to £19. Find the wage of (i) a man, (ii) a boy.

(f) A shopkeeper purchased x apples for y pence: find

(i) the cost per dozen;

(ii) how many apples would have been got for £1.

If 10 of the apples went bad and the remainder were sold at half-a-crown per dozen, express in terms of x and y the number of pence the shopkeeper gained on the whole transaction.

SECTION II.

1. Solve for x and y and express the results in simplest form :
 $(a+b)x+by=ax+(a+b)y=a^3-b^3$.

Verify your solution.

[28 marks.]

2. Find *four* factors of $(x^2-3x)^2-8(x^2-3x)-20$.

Prove that $(a+b+c)$ is a factor of $(b+c)^3+(c+a)^3+(a+b)^3+b^3+c^3+a^3$ and hence factorise the expression.

[28 marks.]

3. Solve graphically the following problem : two cyclists start at noon, one from Dublin to ride to Drogheda (a distance of 31 miles) at 10 miles per hour, and the other from Drogheda to Dublin at 12 miles per hour. At what time will they meet and at what times and at what distances from Dublin will they be 5 miles apart ?

(The rates are assumed uniform.)

[28 marks.]

4. Prove that the roots of the equation $ax^2+bx+c=0$ are

$$\frac{1}{2a} \left\{ -b \pm \sqrt{b^2-4ac} \right\}.$$

Apply this formula to find the roots of the equation $x^2+5x-864=0$.

[28 marks.]

5. Prove that $\log_a x^y = y \log_a x$.

Solve for x in each of the following equations :—

(i) $3^{2.5}=x$,

(ii) $3^2 = 7^{\frac{1}{2}x}$,

(iii) $x^{3.5} = 100$.

[28 marks.]

6. P bought a horse and sold it at a profit of £5. Q bought another and sold it at a profit of £11. If P had sold at the same price as Q did his profit would have been 5%, and if Q had sold at the same price as P did, his profit would have been 25%; at what price did each buy ?

[29 marks.]

7. What is meant by a 'surd' ? Using *geometrical methods* on squared paper and taking one inch as unit, draw two lines A and B such that $A = \sqrt{7}$, $B = \frac{1}{3}(\sqrt{7}+1)$. Explain briefly how you proceed.

[29 marks.]

8. A rectangular box is a feet long, b feet wide, c feet high, and is such that its volume remains unaltered when the length and the width are each increased by one foot and the height diminished by one foot : express c in terms of a , b and hence deduce the values of a and b which correspond to $c=3$, $a=b+1$.

[29 marks.]

9. The accompanying graph represents the variation in value of $[y =] ax^2 + bx + c$ for values of x lying between 2 and -3.5 . Use the graph to determine the values of a, b, c .

[29 marks.]

