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INTERMEDIATE CERTIFICATE EXAMINATION, 1929.

MATHEMATICS (I).

THURSDAY, 13*th* *JUNE*.—Morning 10 a.m. to 12.30 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.

(a) Solve the equation $2\frac{1}{5}x - 3 = \frac{1}{5}x - 2\frac{1}{2}(1 - 3x)$.

[13 marks].

(b) What is (i) a *term*, (ii) a *factor* ? Factorize $2ab - a^2 - b^2 + c^2$.

[13 marks].

(c) Find the values of x, y which satisfy the equations $\frac{1}{2}x = \frac{1}{3}(y - 1)$, $\frac{1}{2}y = \frac{1}{3}(x - 2)$.

[13 marks].

(d) Use the identity $a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$ to find the factors of $x^3 - 8y^3 - 1 - 6xy$.

[13 marks].

(e) Given that $ax^2 + bx + 2$ is the square root of $9x^4 - 6x^3 + 13x^2 - 4x + 4$ find the values of a, b.

[14 marks].

(f) A is four times as old as B, while in 8 years' time one-third of A's age will be equal to B's. What are their present ages ?

[14 marks].

SECTION II.

1. Prove that if the sum of the squares of two numbers is equal to their product, the sum of their cubes is zero. What is the converse theorem? Is it true? Give reasons.

[28 marks].

2. Find for what values of x the expressions $3x^2-x-6$ and x^2+4x+6 will be equal. Find also for what values of x their squares will be equal.

[28 marks].

3. A man has £67 in sovereigns, shillings and pence. He has twice as many shillings and four times as many pence as pounds; how many has he of each sort?

[28 marks].

4. State the Remainder Theorem. Use it to find one factor of x^3-3x^2+x+2 and hence solve the equation $x^3-3x^2+x+2=0$.

[28 marks].

5. Write down a formula giving all numbers which are exactly divisible by 9 after 1 has been added.

How can you represent an odd number symbolically? If x is an odd number, show that x^2-1 is always exactly divisible by 8.

[29 marks].

6. Find in terms of m and n an expression for a number which is such that the product of its m equal parts is the same as the product of its n equal parts. What is the number in the case when $m = 2$ and $n = 3$?

[29 marks].

7. Given $a = 2 \cdot 7$ and $b = 3 \cdot 8$, find $a^2 + b^2$ and $\log_{10}(a^2+b^2)$. From the formula $\dfrac{1}{a^4} = \dfrac{1}{b^4} + \dfrac{1}{x^4}$ express x in its simplest form for logarithms in terms of a, b and hence find x.

[29 marks].

8. Draw a graph of x^2+2x+1 $(= y)$ for values of x between 2 and 3 and from it find as accurately as you can the value of $\sqrt{12 \cdot 5}$. (Indicate the reading on the graph).

[29 marks].