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(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1949.

MATHEMATICS (Algebra).

TUESDAY, 14th JUNE.—MORNING, 10 TO 12.30.

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

Mathematical Tables may be obtained from the Superintendent.

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1. Solve the equations :

   (i) $\frac{4}{5}(\frac{3}{4}x+5) - \frac{7}{8}(x-4) = 3 - \frac{x}{2}$;

   (ii) $\left.\begin{array}{l} 4x - 3y = -1 \\ 2x + y = -8 \end{array}\right\}$

   [30 marks.]

2. Find the common factor of $x^2 - x - 20$ and $2x^3 + 7x^2 - 19x - 60$.
Express in simplest form the value of the fraction

$$\frac{x^2 - x - 20}{2x^3 + 7x^2 - 19x - 60} \qquad \text{when } x = 5\frac{1}{2}.$$

   [30 marks.]

3. Factorise as fully as you can :

   (i) $a^3 + 8b^3$,

   (ii) $x^2 + x - y - y^2$,

   (iii) $(p+3q)(p-3q) - 6q - 1$,

   (iv) $(a^2+a)^2 - 8(a^2+a) + 12$.

   [30 marks.]

4. If the numerator of a given fraction were increased by 4 and the denominator diminished by 2 the resulting fraction would be equal to $\frac{6}{7}$; but if the numerator were diminished by 5 and the denominator increased by 4 the fraction so obtained would be equal to $\frac{1}{3}$. Find the given fraction.

   [30 marks.]

5. Find the roots of the equation $3x^2 = 5(x-1)^2 - 7$, correct to *two* places of decimals.

   [35 marks.]

6. (i) If $x-ay=b$ and $z+cy=d$, prove that $cx+az=bc+ad$.

   (ii) Show that $(x-a)$ is a factor of
   $$x^3-(a+b-c)x^2+(ab-bc-ca)x+abc$$
   and find the other factors of the expression.

   [35 marks.]

Or,

6. Solve the equation $\sqrt{5x+6}-\sqrt{8-2x}=\sqrt{10-3x}$ and test your solutions.

   [35 marks.]

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7. A vessel contains whiskey and water mixed in the ratio of $4:1$ by volume and another vessel contains whiskey and water mixed in the ratio of $7:3$ by volume. How many gallons should be drawn from each of the vessels respectively to make a mixture containing 14 gallons of whiskey and 4 gallons of water?

[35 marks.]

Or,

7. Find the values of x and y which satisfy the simultaneous equations:
$$3\log_{10}(x+5)-2\log_{10}(y-3)=4$$
$$5\log_{10}(x+5)+3\log_{10}(y-3)=13$$

[35 marks.]

8. ABCD is a rectangle in which $AB=5$ ins. and $BC=10$ ins. Points E, F are taken on AB, AD respectively such that $AE=AF=x$ ins. Through E, F lines EM, FL are drawn parallel to AD, AB respectively, meeting each other at N and meeting the diagonal BD at M, L respectively. Express in terms of x the sum [S] of the areas ENFA and LMN.

Draw a graph showing how S changes while x is increasing from 0 to 5 ins. and find from your graph, as accurately as you can, the least value S can have.

[35 marks.]