1950
SCOTTISH LEAVING CERTIFICATE EXAMINATION

MATHEMATICS

Lower Grade—(Second Paper)

Monday, 13th March—1 P.M. to 3.30 P.M.

Before attempting to answer any question, candidates should read the whole of it very carefully, since time is often lost through misapprehension as to what is really required.

Square-ruled paper and four-place logarithmic tables are provided.

All the working must be legible and shown in its proper position in the answer, and the different steps should be clearly indicated.

The value attached to each question or part of a question is shown in the margin.

Marks will be deducted for careless or badly arranged work.

Section I

All the questions in this Section should be attempted.　　*Marks*

1. (i) Factorize completely—
   (a) $8x^3 - 22x^2 + 15x$;　　3
   (b) $x^5 - 4x^3 - 8x^2 + 32$.　　4

   (ii) Simplify—

$$\frac{\dfrac{a-b}{a+b} + \dfrac{a+b}{b-a}}{1 - \dfrac{a^2 + b^2}{a^2 - b^2}}.$$

　　6

Marks

2. Use your tables to find the value of—

(i) $\dfrac{782\cdot4 \times 4\cdot052}{0\cdot4376}$;

4

(ii) $\sqrt{\dfrac{x^2 - 4y^2}{xy}}$, where $x = 45\cdot56$ and $y = 16\cdot27$.

8

3. (i) The average weight of p boys is q lb. The total weight of x of these boys is y lb. What is the average weight of the rest ?

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(ii) In a right-angled triangle one of the sides containing the right angle is twice the other. The area of the triangle is 36 sq. in. What is the length of the longer of the two sides ?

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(iii) A woman obtains 10 lb. of tomatoes more for £1 when they are p pence per lb. than when they are $(p + 1)$ pence per lb. Write down this statement in the form of an equation.

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(iv) A side of a rhombus measures 10 cm. and one diagonal is 12 cm. Using your tables, determine the angles of the rhombus.

(The truth of any geometrical property may be assumed.)

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4. (i) Using a figure, show that $\dfrac{\sin\theta}{\cos\theta} = \tan\theta$, where θ is an acute angle.

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Prove the identity—

$$(\sin\theta + \cos\theta)^2 - 1 = \dfrac{2}{\tan\theta + \cot\theta}.$$

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(ii) If A and B are acute angles such that $5\cos A = 3$ and $13\cos B = 12$, find, without using tables, the value of $\dfrac{\tan A + \tan B}{1 - \tan A \tan B}$.

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SECTION II

Only THREE *questions should be attempted from this Section.*

5. (i) If $\dfrac{3x - 2y}{2x - 4y} = \dfrac{2}{3}$, find the ratio of x to y and hence calculate

4

the value of

$$\dfrac{3x^2 - y^2}{2x^2 + xy + y^2}.$$

4

(ii) In a certain class examination the ratio of the passes to the failures was 13 : 5. If two candidates more had passed the ratio would then have been 7 : 2. How many failed ?

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6. (i) If $a = \sqrt{\left(\dfrac{b - 1}{b + 1}\right)}$, find b in terms of a.

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(ii) At a certain instant a vessel sailing due north at 8 miles per hour is 4 miles south of a buoy A. At the same time another vessel sailing due west at 6 miles per hour is 3 miles west of A. Find the distance of each vessel from A after t hours, and show that, if they are then d miles apart, $d = \sqrt{(25 - 28t + 100t^2)}$.

2, 2
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7. A rectangular garden plot, which is 5 feet longer than it is broad, is surrounded by a path 2 feet 6 inches wide. The area of the path is two-ninths of the area of the plot. Find the length and the breadth of the plot and the cost of erecting a fence along the outside boundary of the path at 9s. per yard.

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8. The following table gives the atmospheric temperature every two hours from 4 a.m. until midnight on a certain day :—

4 a.m.	6 a.m.	8 a.m.	10 a.m.	Noon	2 p.m.	4 p.m.	6 p.m.	8 p.m.	10 p.m.	Mid-night
39°	38·7°	42°	50°	58°	66°	70·5°	69°	57°	45°	39·5°

Taking 1 inch on the axis of x to represent 2 hours and 1 inch on the axis of y to represent 10°, draw a graph showing the temperature throughout the period of twenty hours.

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From your graph—

    (i) find the temperature at 1 p.m. and also the times at which the temperature was 60° ;   1, 1, 1

    (ii) estimate the maximum temperature and the time at which it was reached ;   1, 1

    (iii) determine the period during which the temperature appeared to rise at a uniform rate and what this uniform rate was ;   2, 2

    (iv) determine the period during which the temperature was decreasing most rapidly.   2

9. In the accompanying diagram, which should be sketched into your book, ABCD is a rectangle in which AB = 5 cm., BC = 4 cm. and angle BAX = 25°. Using your tables, calculate the distances of D and C from AX.   7, 9