S 33

OXFORD LOCAL EXAMINATIONS

SCHOOL CERTIFICATE

TUESDAY, JULY 12, 1949

TIME ALLOWED—2 HOURS

Algebra

[Write ALGEBRA at the head of each sheet of your answers.

Do not write your answers to different questions or parts of a question side by side, but one under the other with a small gap between.

All necessary work must be shown. No credit will be given for answers without sufficient work.]

[*Mathematical tables and squared paper are provided.*]

1. (i) Multiply $x^2-3xy+y^2$ by $x^2+3xy-y^2$.

(ii) Simplify:

(1) $a^m \times a^n \div a^{m-n}$;

(2) $\dfrac{x^3-6x^2y}{3x^2y-18xy^2}$;

(3) $\dfrac{2a-b}{a^2-ab}+\dfrac{a-2b}{ab-b^2}$.

2. Solve the equations:

(i) $x-y=\dfrac{3}{7}(x+y)=3x-7y+4$;

(ii) $x^2+5=12x$, giving the roots correct to two places of decimals.

3. (i) Factorize:

(1) $8x^2+22x-21$;

(2) $(a+b)^2-(a-c)^2$.

(ii) Given that $2a(x+b)-2b(x-a)=(a+b)^2$, express x in terms of a and b as simply as possible.

4. A rectangle is 2 ft. 6 in. longer than it is wide. If each side is increased by 2 ft. 6 in. the area is increased by one quarter of its original amount. Find the original area.

5. A shopkeeper bought $(p+q)$ articles at x shillings each. He sold p at $(x+a)$ shillings each and q at $(x+2a)$ shillings each. His profit on the whole transaction was 20 per cent. Show that

$$\frac{p}{q} = \frac{10a-x}{x-5a}.$$

Assuming this result if you cannot prove it, express a as a fraction of x when $p = 360$ and $q = 240$.

6. Draw the graph of $y = x^2 + \frac{24}{x} - 15$, for values of x from 1 to 4, taking the side of a large square as $\frac{1}{2}$ unit on the axis of x and as 1 unit on the axis of y. From the graph determine

(i) the value of x for which y is least;

(ii) the range of values of x for which $x^2 + \frac{24}{x}$ is less than 19.

7. Given that $A = P.R^n$, use logarithms to calculate

(i) the value of A when $P = 38{\cdot}5$, $R = 1{\cdot}03$, and $n = 5$;

(ii) the value of R when $P = 56$, $A = 47{\cdot}8$, and $n = 3$.

Give your answers to three significant figures.

8. State and prove a formula for the sum of the first n terms of an arithmetical progression.

Find the sum of all the three-figured numbers which are multiples of 7.

9. On the first two days of an auction sale for second-hand cars, the amounts realized were £4,800 and £4,950 respectively. Ten more cars were sold on the second day than on the first but the average price obtained for a car was £5 less on the second day. Find the number of cars sold on the first day.