213TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Monday, June 14, 1915 — 9.15 a. m. to 12.15 p. m., only

Write at top of first page of answer paper (*a*) name of school where you have studied, (*b*) number of weeks and recitations a week in (1) elementary algebra, (2) intermediate algebra.

The minimum time requirement is four recitations a week for half a school year, after the completion of elementary algebra.

Answer eight questions. Each answer should be reduced to its simplest form.

1 *a* Factor $27^{-1}x^3 - 8$

  b Find the value of $\dfrac{1}{8^{-\frac{2}{3}}} - 3\times 2^0 + 27^{-\frac{1}{3}}$

2 Solve the following:

$$\frac{\sqrt{a}+\sqrt{x}}{\sqrt{a}-\sqrt{x}} = \frac{2\sqrt{x}}{\sqrt{a}+\sqrt{x}} - \frac{(x+a)^2}{a(x-a)}$$

3 Form the quadratic equation the product of whose roots shall be twice the sum of the roots of $x^2 - 3x + 8 = 0$, and the sum of whose roots shall be twice the product of the roots of $2x^2 + 4x - 7 = 0$

4 Plot the graph of $x^2 + y^2 = 28$ and of $5x + 2y = 10$ and from these graphs estimate the solutions of these equations taken as a system.

5 When 3, -6 etc. is an arithmetic progression, find the sum of the first 50 terms; when it is a geometric progression, find the 12th term.

6 *a* In the quadratic equation $8x^2 + px + 9 = 0$, one root is double the other. Find p.

  b Form the equation whose roots are

$$2 - \sqrt{-3} \text{ and } 2 + \sqrt{-3}$$

7 Solve (*four* solutions) $x^2 + x + 2 = 7\sqrt{x^2 + x + 2} - 10$

8 Write in simplest form with positive exponents the fourth and fifth terms of $\left(2a^{-\frac{3}{2}}b - a^{\frac{1}{2}}b^3\right)^8$

9 *a* Solve the equation $ax^2 + bx + c = 0$

  b State the condition under which the roots of the above equation are (1) rational, (2) unequal and containing surds, (3) complex, (4) equal.

10 The length of a rectangular sheet of paper is 3 inches greater than its width. From each corner a piece 1 inch square is cut out. The paper is then folded to form a box with open top. If the box contains 54 cubic inches, what were the dimensions of the sheet of paper?