227TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Monday, June 19, 1922 — 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, including either question 8 or question 9. Full credit will not be granted unless all operations (except mental ones) necessary to find results are given; simply indicating the operations is not sufficient. Each answer should be reduced to its simplest form.

In the examination in intermediate algebra the use of the slide rule will be allowed for checking, provided all computations with tables are shown on the answer paper.

1 Factor *each* of the following:

$a^{12} - b^8$ [2½]

$6x^2 + 3x - 18$ [2½]

$x^4 - 1.8x^2 + .81$ [2½]

$y^3 - 5y^2 + 2y + 8$ [2½]

$a^{2n} + 2a^{3n}b^2 + a^{4n}b^4$ [2½]

2 *a* Simplify as far as possible *each* of the following expressions: -16^{-1}; $\dfrac{2^0 - 2^{-2}}{2 - 3(4)^{-1}}$; $\sqrt{-16}$ [2, 4, 1]

b Rationalize the denominator in $\dfrac{\sqrt{6} - \sqrt{3}}{4 - 2\sqrt{2}}$ and express the resulting fraction in its simplest form. [5½]

3 Reduce to a simple fraction in its lowest terms and check, letting $x = 3$: $\dfrac{\dfrac{x+2}{x-2} + \dfrac{x-2}{x+2}}{\dfrac{x+2}{x-2} - \dfrac{x-2}{x+2}}$ [9½, 3]

4 *a* Solve the equation $ax^2 + bx + c = 0$ by the method of completing the square. [6½]

b Express in simplest form the sum of the roots and the product of the roots in terms of a, b and c. [3]

c Form the equation whose roots are -7 and 3. [3]

5 It cost $74.25 to have a well dug; if the cost of digging was $3 for the first yard, $3.75 for the second yard, $4.50 for the third yard etc., how deep was the well? [Solve by formulas.] [12½]

6 Find the roots of the equation $0.3x^2 = 4x + 1.01$ to the *nearest* tenth. [12½]

7 The sum to which a given principal will amount if placed at compound interest is expressed by the formula $A = P(1+r)^n$ in which $A =$ amount, $P =$ principal, $r =$ interest on $1 for one year and $n =$ number of years. Find the principal that will amount to $575 in 20 years at 4½%, interest compounded annually. [Use logarithms to shorten the computation.] [12½]

8 The sum of the volumes of two cubes is 43 cubic feet; find the length of an edge of each cube if the sum of these two lengths is 4 feet. Equation [4], solution [8½]

9 A dealer bought a number of sheep for $440; after 5 had died he sold the remainder at a profit of $2 each, thereby making $60 on the whole transaction. How many did he buy? Equation [6½], solution [6]

10 Solve and check one root:

$$\sqrt{2x+3} - \sqrt{x+1} = \sqrt{5x-14}$$ [10, 2½]

11 Represent graphically *each* equation in the following set and from the graph read the solutions common to the two equations:

$$x^2 + y^2 = 100$$
$$x - 2y = -10$$ [4, 4½, 4]