The University of the State of New York

229TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Monday, June 18, 1923—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 five recitations a week for half a school year, or the equivalent, after the completion of elementary algebra.

Answer eight questions, including either question 9 or question 10. 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 Find the prime factors of *each* of the following:

$4(a+b)^2-20(a+b)+25$ [2½]

x^7-729x [2½]

$30cd-25d^2+16a^2-9c^2$ [2½]

x^3-4x^2+5x-2 [2½]

$12x^{2m}-43x^my^n+35y^{2n}$ [2½]

2 *a* Rationalize the denominator in $\frac{\sqrt{10}}{\sqrt{5}-\sqrt{2}}$ [4]

b Solve and check:

$\sqrt{x}-\sqrt{x+5}+1=0$ [7, 1½]

3 Find the roots of the following equation to the *nearest hundredth*: $.3x^2-.02x=.5$ [12½]

4 Solve for x and y, correctly group your answers and check *one* set:

$$x^3+y^3=35$$
$$x^2-xy+y^2=7$$ [10½, 1, 1]

5 *a* Multiply [8]

$x^{\frac{1}{2}}-3x^{\frac{1}{4}}+5$ by $x^{-\frac{1}{2}}+2x^{-\frac{1}{4}}-1$

b Write the product with positive exponents in ascending powers of x. [3]

c Write the answer to *b* in radical form. [1½]

INTERMEDIATE ALGEBRA—*concluded*

6 *a* *Without solving*, determine the nature of the roots of the equation $3x^2+5x=12$ [4]

b Form the quadratic equation whose roots are $\frac{1}{2}$ and $\frac{4}{3}$ [4]

c For what value of k will the roots of $3x^2-2x+k=0$ be equal? [4½]

7 *a* Deduce the fundamental formula for the sum of an arithmetic progression in terms of the number of terms, the first term and the last term. [6]

b Insert *four* geometric means between $\frac{2}{3}$ and $-\frac{1}{48}$ [6½]

8 By the use of logarithms find the value of $\frac{(8.54)^3\times\sqrt[5]{0.148}}{0.9532}$ [12½]

9 A boat can travel 8 miles an hour in still water; if it can travel 20 miles downstream in the same time that it can travel 12 miles upstream, what is the rate of the stream?

Equation [8], solution [4½]

10 If 20 rods are added to the length of a certain rectangular field and 4 rods are subtracted from the width of this field, the area will be increased 40 square rods; if 10 rods are subtracted from the length and 5 rods are added to the width, the area will be diminished 50 square rods. Find the dimensions of the field.

Equation [8], solution [4½]

11 Using the same set of axes, represent graphically the following set of equations and from the graphs determine the solutions that the two equations have in common:

$$x+3y=12$$
$$x^2=6y$$ [8½, 4]