The University of the State of New York

235TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Thursday, January 21, 1926 — 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. 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 *a* Factor $7x(a-b)-3(b-a)$ [3]

b Factor $49(a+1)^2-9x^2$ [3]

c Factor x^4-4x^2+24 [3]

d A man travels c^3 miles at the rate of c miles an hour and d^3 miles at the rate of d miles an hour. How much time is consumed by the journey? How much time would be consumed by the journey if he traveled the entire distance at the rate $c+d$ miles an hour? [1½, 2]

2 *a* In the geometric progression $\sqrt{2}, \sqrt[3]{2}$ . . ., find the 22d term. [7½]

b If two fractions $\frac{a(a-b)}{ab+b^2}$ and $\frac{a}{b}$ are the first two terms of an arithmetic progression, what is the common difference? [5]

3 Solve the following for x and y and check:

$$x^2-y^2=3(a^2-b^2)$$
$$x-y=a+b \qquad [10\tfrac{1}{2}, 2]$$

4 *a* If $r=\sqrt[3]{\frac{3V}{4\pi}}$, find r when $\pi=3.14$ and $V=56.3$ [6½]

b If $A=P(1+r)^n$, find A when $P=\$1000$, $r=0.04$ and $n=10$ [6]

5 *a* In the equation $x^2-2x-k=0$, determine k so that one root shall be 3 greater than the other. [7½]

b In the equation $3x^2-4x+m=0$, determine the value of m for which the roots will be real and equal. [5]

6 A boy on a bicycle rode 9 miles into the country. He started back immediately over the same route, walking at a rate of 6 miles an hour less than his rate of riding. On arriving at the starting point he found that he had been gone 4 hours. At what rate did he ride his bicycle? [12½]

7 The base and altitude of a rectangle are in the ratio 3:2. If each dimension is increased by 4 the area of the rectangle is doubled. Find the dimensions of the rectangle. [12½]

8 A man wishes to start a Christmas fund on the following conditions: He is to deposit \$18 on January 1 and to make future deposits on the first of every month to December 1 inclusive; each deposit is to be smaller than the one immediately preceding it by a constant amount and the sum of all his deposits (excluding interest) is to be \$150. By what constant amount should each succeeding deposit be diminished? [12½]

9 The hypotenuse of a right triangle is 13. If one leg is 5 greater than the other, find the length of each leg of the triangle correct to the *nearest tenth*. [12½]

10 Solve the following equation:

$$2\sqrt{x}-\sqrt{4x-3}=\frac{1}{\sqrt{4x-3}} \qquad [12\tfrac{1}{2}]$$

11 *a* Construct the graph of $y=\frac{3}{5}x-3$. [Make the scale large enough so that the work required below will appear distinct and not crowded.] [4½]

b With the aid of this graph indicate by using letters the distance on the x-axis which represents the root of (1) $\frac{3}{5}x-3=0$, (2) $\frac{3}{5}x-3=-2$ [6]

c From the graph in *a* determine the values of x that make $\frac{3}{5}x-3$ positive. [2]

12 The length of a rectangle is x, its perimeter is 14 and its area is y.

a Express y in terms of x. [5]

b Construct the graph of the relation obtained in *a* for values of x from 0 to 7 inclusive. [5]

c From the graph determine the greatest value that y can have. What is the corresponding value of x? [2½]