New York State Education Department

205TH HIGH SCHOOL EXAMINATION

ADVANCED ALGEBRA

Monday, September 18, 1911—9.15 a. m. to 12.15 p. m., only

Answer eight questions. No credit will be allowed unless all operations (except mental ones) necessary to find results are given; simply indicating the operations is not sufficient. Each complete answer will receive 12½ credits. Papers entitled to less than 75 credits will not be accepted.

1 Define *four* of the following: combinations, complex number, permutations, commensurable roots, determinant.

2 How many different committees, each consisting of 4 boys and 2 girls, can be formed from 8 boys and 4 girls?

3 Represent graphically and construct the sum of $2-5i$ and $-4+3i$.

4 Prove that if two rows or two columns of a determinant are identical the determinant vanishes.

5 Prove $\begin{vmatrix} b+c & a-b & a \\ c+a & b-c & b \\ a+b & c-a & c \end{vmatrix} = 3abc - a^3 - b^3 - c^3$

6 Solve graphically $\begin{cases} y^2 = 4x \\ y+3 = 2x \end{cases}$

[Approximation to tenths.]

7 Find the sum and the product of the roots in the following: $x^3 - 7x + 6 = 0$. State the principle used in obtaining your answer.

8 Prove that if a is a root of an equation in the form of $x^n + px^{n-1} + qx^{n-2} + \ldots + ux + v = 0$, the first member is divisible by $x - a$.

9 The roots of the following equation are real; determine their signs: $x^3 - 10x + 3 = 0$. Explain.

10 One root of the equation $x^3 - 3x^2 - 2x + 5 = 0$ lies between 3 and 4; find by Horner's method the value of this root to *two* decimal places.