207TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Monday, June 17, 1912 — 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 algebra.

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

Answer eight questions, selecting two from each group. 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.

Group I

1 Factor *each* of the following: $a^2 + b^2 - c^2 - 9 - 2ab + 6c$; $a^4 - 3a^2 + 9$; $x^6 + y^3$; $2y + x^2 - 4y^2 - x$

2 Find to *three* terms the square root of $x^2 - 6$. Find the square root of $18 - 12\sqrt{2}$

3 Separate 12 into *two* parts such that their product shall be to the sum of their squares as $2:5$.

Group II

4 From $\dfrac{3}{5 - 2\sqrt{3}}$ subtract $\dfrac{1}{2 + \sqrt{3}}$ and express the result as a fraction having a rational denominator.

5 Solve $2x^{\frac{1}{3}} = x^{\frac{1}{6}} + 1$

6 Write with integral coefficients the quadratic equation whose roots are $\dfrac{2 + \sqrt{-11}}{3}$ and $\dfrac{2 - \sqrt{-11}}{3}$

Group III

7 Prove that in a geometric progression $S = \dfrac{a(1 - r^n)}{1 - r}$

8 Divide $9a^{\frac{1}{2}} - 3a^{\frac{1}{4}} + 1 + 7a^{-\frac{1}{4}} - 6a^{-\frac{1}{2}}$ by $3 + a^{-\frac{1}{4}} - 2a^{-\frac{1}{2}}$

9 Write the *r*th term of $(a - b)^n$. Apply this formula in finding the *sixth* term of $(2m^2 - x^{\frac{1}{2}})^8$

Group IV

10 Solve $\begin{cases} \dfrac{1}{cx} + \dfrac{1}{dy} = m \\ \dfrac{1}{dx} - \dfrac{1}{cy} = n \end{cases}$

11 Plot the graph of $x^2 - 2x - 2 = y$ between the values $x = -3$ and $x = +4$ and estimate from the graph the roots of $x^2 - 2x - 2 = 0$

12 How many arithmetic means are inserted between $-\frac{3}{2}$ and $\frac{9}{2}$ when the sum of the means is $21\frac{1}{2}$?