NEW YORK STATE EDUCATION DEPARTMENT
204TH HIGH SCHOOL EXAMINATION
INTERMEDIATE ALGEBRA

MONDAY, JUNE 12, 1911 — 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
OF FOUR RECITATIONS A WEEK FOR HALF A SCHOOL YEAR, AFTER THE COMPLETION
OF ELEMENTARY ALGEBRA.

ANSWER EIGHT QUESTIONS, SELECTING TWO FROM EACH GROUP. NO CREDIT
WILL BE ALLOWED UNLESS ALL OPERATIONS (EXCEPT MENTAL ONES) NECESSARY TO
FIND RESULTS ARE GIVEN; SIMPLY INDICATING THE OPERATIONS IS NOT SUFFICIENT.

GROUP I

1. Find the prime factors of the following: \( \frac{8}{a^8} = 27b^6; \)
\( 1 = m^2n^2 - p^2r^2 + 2mnp; \)
\( 8a^{13} + 8am^{12}; \)
\( 4(x - y)^3 = (x - y) \)

2. In the proportion \( a:b:c:d, \) prove that the terms are
in proportion by (a) inversion, (b) composition.

3. Form the quadratic equation whose roots are \(-4 + 5\sqrt{3}\)
and \(-4 - 5\sqrt{3}.\) State the relation between the roots and the
coefficients of the equation thus formed.

GROUP II

4. Find the number of terms in an arithmetical pro-
gression if \( d = 3, \ l = 302, \ a = 5.\)
Find the sum of the series \( 3, -6, 12, \ldots \) to 6 terms.

5. Simplify \( 3\sqrt{3} + \sqrt{-3}; \)
\( 5\sqrt{-\frac{1}{2}} - 3\sqrt{-\frac{1}{2}} + 4\sqrt{-50} - \sqrt{-200}; \)
\((-\frac{1}{2} + \frac{1}{2}\sqrt{-3})^8.\)

6. Solve \( 4x^4 - 5x^2 + 1 = 0.\)

GROUP III

7. Plot the graph of the equation \( x^2 + 2x - 8 = y.\)

8. If the length of a rectangle is increased by 2 feet and its
breadth is diminished by 1 foot its area remains the same, but
if its length is diminished by 2 feet and its breadth diminished
by 4 feet it loses \( \frac{1}{4} \) of its area; find its length and breadth.

9. Simplify and express with positive indices:
\( (\frac{a^{\frac{3}{4}}x^{\frac{1}{2}}}{x^{\frac{3}{4}}})^2; \)
\( \sqrt[3]{\frac{a^{-1}}{x^{-3}}}; \)
\( \frac{\sqrt{7a^6}}{\sqrt{x^5}}. \)

GROUP IV

10. Solve \( \begin{cases} 
\frac{1}{x} + \frac{1}{y} = 3 \\
\frac{1}{x^2} + \frac{1}{y^2} = \frac{7}{9} \end{cases} \)

11. Expand by the binomial formula \( (1 - \frac{5}{2x})^8.\)

12. Derive the formula for (a) the last term of a geometric
series, (b) the sum of a geometric series.