University of the State of New York
High School Department
168TH EXAMINATION
ALGEBRA

Thursday, March 28, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first five questions and five of the others but **no more.** *If more than five of the others are answered only the first five answers will be considered. Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: trinomial, involution, exponent, affected quadratic, literal equation, elimination, degree of a term.

2 Simplify $a^2-[a-(a+b)(a-1)+ab-\{-\overline{b+a^2}+2(a+b)\}]$

3 Simplify $\dfrac{\left(x-\frac{1}{x}\right)^2}{\left(1+\frac{1}{x}\right)\left(1-\frac{1}{x}\right)^2}\left(\dfrac{1-x}{x}+\dfrac{x}{1+x}\right)$

4 Factor $2a^2+23a-12$, $27a^3-8$, $mn+n^2y-mx-nxy$, x^7+y^7, $18-2a^2-4ab-2b^2$

5 Solve $\dfrac{x-3b}{c}=\dfrac{9(c-b)}{x}$

6 Multiply $x^{\frac{5}{3}}-x^2y^{\frac{1}{3}}+x^{\frac{3}{2}}y^{\frac{2}{3}}-xy+x^{\frac{1}{2}}y^{\frac{4}{3}}-y^{\frac{5}{3}}$ by $x^{\frac{1}{2}}+y^{\frac{1}{3}}$

7 Solve $\begin{cases} \dfrac{a}{x}+\dfrac{c}{y}=b \\ \dfrac{c}{x}+\dfrac{a}{y}=d \end{cases}$

8 The sum of the reciprocals of two numbers is 7 and the sum of the reciprocals of their squares is 25; find the numbers.

9 Find the greatest common divisor (highest common factor) of $9a^3-a-2$ and $3a^4+2a^3-8a^2-6a-3$

10 Extract the cube root of $-x^6-6x^5+40x^3-96x+64$

11 If the width of a certain rectangle is increased by 2 inches, the area of the rectangle is 12 square inches; if the length is increased by 1 inch, the area of the rectangle is 8 square inches. Find the sides of the rectangle.

12 Solve $\begin{cases} x-2y=2 \\ x^2-6y^2=74-xy \end{cases}$

13 Expand by the binomial theorem $\left(\dfrac{1}{x^2}-\dfrac{x}{3}\right)^6$

14 Simplify $3\sqrt{63}-\sqrt{112}-12\sqrt{3\frac{1}{9}}$, $\dfrac{1}{a+\sqrt{2}}+\dfrac{1}{a-\sqrt{2}}$; $(a\sqrt{b}-b\sqrt{a})(\sqrt{b}+\sqrt{a})$

15 Solve $\sqrt{2x+11}-\sqrt{x-3}-\sqrt{x+2}=0$