High School Department

161ST EXAMINATION

ALGEBRA

Thursday, September 28, 1899—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. Division of groups is not allowed. 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 *polynomial, exponent, degree of a term, affected quadratic, surd.*

2 Simplify $\dfrac{\dfrac{1}{x}-\dfrac{x+a}{x^2+a^2}}{\dfrac{1}{a}-\dfrac{a+x}{a^2+x^2}}+\dfrac{\dfrac{1}{x}-\dfrac{x-a}{x^2+a^2}}{\dfrac{1}{a}-\dfrac{a-x}{a^2+x^2}}$

3 Simplify $2a-[3b-2\{b-a-(b-a)+2b\}-2a]$

4 Factor a^6-b^6, $9a^6+6a^3+1$, $6a^3+9ab-3b-2a$, $12x^2+7xy-10y^2$, a^8-b^8

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

6 Solve $\dfrac{4}{x}-\dfrac{3}{y}=2$, $\dfrac{8}{2x}-\dfrac{1}{y}=-1\frac{1}{2}$, and verify the results.

7 Four times the square of a certain number increased by six times the number equals 108; find the number.

8 The sum of the perimeters of two squares is 23 feet and the sum of the areas of the squares $16\frac{1}{16}$ feet; find the sides of the squares.

9 Expand to *five* terms by the binomial formula $(a^3-3b^2)^7$

10 Extract the square root of $\dfrac{x^4}{4}+\dfrac{x^3}{y}+\dfrac{x^2}{y^2}-xy-2+\dfrac{y^2}{x^2}$

11 Simplify the following:

$$\sqrt{128},\ \sqrt[8]{\frac{a^4b^8}{c}},\ \sqrt{\frac{a^2b}{c}}\times\sqrt{\frac{a^2c^2}{b}},\ \sqrt{48}+\sqrt{75}-\sqrt{27}$$

12–13 Solve the following equation, giving an axiom as authority for each step of the solution: $\dfrac{2x}{3}+\dfrac{x}{2}+4=15$

14–15 Divide $a^n\pm b^n$ by $a\pm b$ and show under what conditions the division will be exact.