High School Department

169TH EXAMINATION

ALGEBRA

Monday, June 17, 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. 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 Simplify $\dfrac{x-y}{1+\dfrac{x-y}{x+y}} \div \dfrac{\dfrac{x}{x-y}-1}{1-\dfrac{x}{x+y}} \times \dfrac{2x}{(x-y)^2}$

2 Factor *five* of the following: x^6+x, $2a^2+13a-24$, a^4-81, $ay+by-a-b$, $a^4+a^2b^2+b^4$, a^3+216, $b^2-a^2+2ac-c^2$

3 Find the least common multiple of $2ab^3-10ab-4a$ and $2b^3-2b+12$

4 Solve $\frac{1}{x}+\frac{2}{y}-\frac{1}{z}=3\frac{1}{2}$, $\frac{2}{x}-\frac{1}{y}+\frac{3}{z}=-3$, $\frac{1}{x}-\frac{3}{y}-\frac{2}{z}=-\frac{1}{2}$

5 Solve $5x^2-15x=32-2x^2+5x$

6 A man says that $\frac{3}{4}$ of his age two years ago is equal to $\frac{2}{3}$ of his age three years hence; find his present age.

7 Multiply $2+a^{-1}-a^{-2}$ by a^2-a-2

8 Solve $x+\sqrt{b^2+x^2}=\dfrac{2b^2}{\sqrt{b^2+x^2}}$

9 The sum of the three digits of a number is 9, the digit in the hundreds place is $\frac{1}{2}$ that in the units place; if the digits are reversed the new number exceeds the original number by 198. Find the number.

10–11 Solve $\begin{cases} 2x^2-3xy+2y^2=8 \\ y^2-x^2=5 \end{cases}$

12 Simplify $\sqrt[3]{a^2} \times \sqrt[4]{a^3}$; $\sqrt[3]{\sqrt[4]{a^3}}$; $\dfrac{\sqrt{48}-\sqrt{27}}{\sqrt{12}}$; $3\sqrt[3]{54}-2\sqrt[3]{\frac{1}{4}}$

13 Write out by the binomial theorem the first *three* terms of $(2x^2-y^3)^8$, giving all the work for finding the coefficients.

14 The sum of the perimeters of two squares equals 140 feet; the sum of their areas equals 617 square feet. Find the side of each square.

15 Define *five* of the following: axiom, common factor, polynomial, numeric equation, simultaneous equations, quadratic equation, surd.