High School Department

164TH EXAMINATION

ALGEBRA

Monday, June 11, 1900—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 credit. Papers entitled to 75 or more credits will be accepted.

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

2 Divide $1 - a^2 - 6ax - 8x^2$ by $1 - a - 2x$

3 Factor x^2+x-30, $64-y^4$, $a^{12}+1$, $\dfrac{x^2}{4}-xy+y^2$, $a^4-5a^3b^2+4b^4$

4 Solve $\begin{cases} 2x+y-3z=-5 \\ x+3y=7 \\ 2z-5y=-4 \end{cases}$

5 Solve $8x^2-2x-3=0$

6 Define *five* of the following: *factor, reciprocal, surd, involution, root, simultaneous equations, similar terms.*

7 The age of the elder of two boys is twice that of the younger; three years ago it was three times that of the younger. Find the age of each.

8 Multiply $2x-x^{\frac{2}{3}}+x^{-\frac{1}{3}}$ by $x^{\frac{1}{3}}-x^{-1}+x^{-\frac{2}{3}}$

9 Find the cube root of $8x^6-12x^5-30x^4+35x^3+45x^2-27x-27$

10 Write out by the binomial theorem the first *four* terms of $\left(\dfrac{x^2}{2}-4y \right)^7$, giving all the work for finding the coefficients.

11 Reduce to its lowest terms $\dfrac{x^3-13x+12}{x^4+3x^3+12x-16}$

12 Simplify $\dfrac{\sqrt{x^2-1}+\sqrt{x^2+1}}{\sqrt{x^2+1}-\sqrt{x^2-1}}$, $\dfrac{b}{a^n}\sqrt[3]{\dfrac{a^{3n+1}}{b^3}}$, $\dfrac{\sqrt{a^2-b^2}}{\sqrt[4]{(a-b)^2}}$

13 Solve $\sqrt{x-1}+\sqrt{x}=\dfrac{2}{\sqrt{x}}$

14 Solve $\begin{cases} x^2+y^2=9 \\ x^2y=6-xy \end{cases}$

15 A number is composed of two digits the difference of whose squares is 20; if the digits are interchanged the resulting number is 18 less than the original number. Find the number.