High School Department

155TH EXAMINATION

ALGEBRA

August 1898 — Three hours, 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 $\dfrac{x^3+xy+y^3}{x+\sqrt{xy}+y} \div \dfrac{x-\sqrt{xy}+y}{x-\left(-\frac{1}{x}\right)}$

2 Simplify $a-\{-2a-[-3a-(-4a-\overline{5a-6a})]\}$

3 Factor x^3-y^3, $x^8+x^4y^4+y^8$, $2a^2-10a-28$, x^4-y^4, $6a^2+7ax-3x^2$

4 Solve $\dfrac{a}{x}+\dfrac{b}{y}=\dfrac{c}{d}$, $\dfrac{m}{x}+\dfrac{n}{y}=\dfrac{r}{s}$

5 Solve $x^2+3xy=27$, $3y^2+2xy=24$

6 Perform the operation indicated in the following:

$(x-y^n)\div(x^{\frac{1}{2}}-y^{\frac{1}{2}})$

7–8 A father being asked the age of himself and of his son replied: 'Five years ago my age was two years more than four times that of my son, and five years hence my age will be two years less than six times that of my son.' Find the age of each.

9 Write by the binomial theorem the first *five* terms of $(a^2-\frac{1}{2}b^n)^8$

10 Simplify $\sqrt[3]{x^2}\times\sqrt[3]{x^2}$, $\sqrt{48}+\sqrt{27}$, $\sqrt{(a+b)^2c^2}-\sqrt{(a-b)^2c}$

11 Find the square root of $\frac{1}{x^4}+\frac{2}{x}+2+x^2+2x^3+x^4$. [Give all the work.]

12 Find *four* roots of the following equation: $2x^4+5x^2=207$

13–14 Prove that $-a$ multiplied by $-a$ produces $+a^2$

15 Define *highest common factor, quadratic surd, degree of a term, simultaneous equations, pure equation.*