High School Department

163D EXAMINATION

ALGEBRA

Thursday, March 29, 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. 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 $\dfrac{\frac{a^2}{y}+\frac{y^2}{a}}{\frac{1}{a^2}-\frac{1}{ay}+\frac{1}{y^2}}$

2 Divide $\frac{1}{x^2}+1+x^2$ by $\frac{1}{x^2}-\frac{1}{x}+1$

3 Factor a^4+b^{16}, $21-4c-c^2$, $x^4+\frac{x^2}{2}+\frac{1}{16}$, $a^8+b^4+a^2b^2$, y^8-1

4 Solve $\begin{cases} by-ax=2b \\ \frac{x}{b}+\frac{y}{a}=\frac{2}{b} \end{cases}$

5 Solve $6x^2-x-2=0$

6 Find the greatest common divisor (highest common factor) of $4x^3+x-1$ and $6x^3+x^2-1$

7 A man rowing on a river whose rate of flow is 2 miles an hour finds that it takes him three times as long to row a mile up stream as to row a mile down stream; find his rate of rowing in still water.

8 Extract the square root of $\frac{9}{4}x^4-x^3+15\frac{1}{4}x^2-\frac{10}{3}x+25$

9 Expand by the binomial theorem $\left(2a^3-\frac{b^2}{3}\right)^3$

10 Simplify $\sqrt[4]{\frac{81}{1296}a^{20}b^8c^{12}}$, $\dfrac{x^{n-1}y^{n+1}}{x^{n+1}y^{n-1}}$, $\sqrt{8y}-\sqrt{50y^3}+y^2\sqrt{\frac{2x^2}{y^2}}$

11 Solve $\sqrt{x+a^2}-\sqrt{x-a^2}=\sqrt{2b}$

12–13 Solve $\begin{cases} x^2+y^2=61 \\ x^2-xy=6 \end{cases}$

14–15 The perimeter of a rectangle is 92 feet and its diagonal is 34 feet; find the area of the rectangle.