

High School Department

162D EXAMINATION

ALGEBRA

Monday, January 22, 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 credits. Papers entitled to 75 or more credits will be accepted.

1 Simplify $x - [2a + 3x - \{a - (2x + 3a - \overline{a+x})\}]$

2 Simplify $\frac{\frac{a^2+b^2}{b} - a}{\frac{1}{b} - \frac{1}{a}} \times \frac{a^2-b^2}{a^2+b^2}$

3 Factor $ab^2 - ab$, $a^2 - a^4 - a^2 + 1$, $y^2 + y^4 + \frac{1}{4}$, $\frac{c^2}{d^2} + \frac{2c}{d} - 3$, $x^2 + x^4 + 1$

4 Solve $\begin{cases} ax + by = c \\ bx - ay = d \end{cases}$

5 Solve $3x^2 - 7x - \frac{1}{4} = 1$

6 Find the greatest common divisor (highest common factor) of $3x^2 - 2x - 21$ and $3x^2 - 3x^3 - 63x + 135$

7 Define five of the following: *power*, *homogeneous terms*, *axiom*, *radical*, *surd*, *index*, *integer*.

8 A sum of money at simple interest amounts in 8 months to \$260 and in 20 months to \$275; find the principal and the rate of interest.

9 Divide $x^3 - y^3$ by $x^{\frac{1}{2}} - y^{\frac{1}{2}}$

10 Expand by the binomial theorem $(a^2 - \frac{b}{2})^4$

11 Extract the cube root of $x^3 - 3x^2 + 9x - 13 + \frac{18}{x} - \frac{12}{x^2} + \frac{8}{x^3}$

12 Simplify $\frac{d}{a-b} \sqrt{\frac{a^2c^2 - 2abc^2 + b^2c^2}{d^2}}$; $\frac{y^2}{19} \sqrt{\frac{75a^2b^4x}{2y^6}}$; $\frac{x}{y} \sqrt[3]{\frac{y^{m+1}}{x^{m+1}}}$

13 Solve $\begin{cases} x + y = 1 \\ x^2 + y^2 = 61 \end{cases}$

14 Solve $\sqrt{x^2 - a^2x} = \sqrt[4]{x^4 + b^4x^3}$

15 The square of the sum of two numbers exceeds the sum of their squares by 240, and the difference of their squares exceeds the square of their difference by 112; find the numbers.