

High School Department

167TH EXAMINATION

ALGEBRA

Monday, January 21, 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. 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 $x^2 - \{-x - x(x-1) - (x^2-2) - 2[x^2 - \overline{1+x}]\}$

2 Simplify $\frac{2a\left(\frac{b}{a-b}\right)}{\frac{3a}{2a-2b}} \div \frac{b}{a + \frac{3-a}{4}}$

3 Factor five of the following: $a^4 - a$, $6a^2 + 5a - 6$, $x^4 + x^2 + 1$, $a^2 - (b^2 + 2b + 1)$, $64x^3 + c^3$, $x^2y - xyz - xb + bz$, $x^4 - y^4$

4 Solve $\begin{cases} 2x - 3y - z = 6 \\ 3x + 5y + 4z = 5 \\ x + 2y + z = 1 \end{cases}$

5 Solve $\frac{6}{x+1} + \frac{3}{x-1} = 5$

6 The difference of the squares of two consecutive numbers is 27; find the numbers.

7 Extract the square root of $49a^4 - \frac{14a^3}{5} + \frac{1051a^2}{25} - \frac{6a}{5} + 9$

8 Find the greatest common divisor (highest common factor) of $6m^3 - 7m^2 + 1$ and $4m^4 - 9m^2 + 6m - 1$

9 Solve $\begin{cases} x^2 - y^2 = 45 \\ xy + y^2 = 18 \end{cases}$

10 Divide $x^{4a} + 4x^{3a}y + 6x^{2a}y^2 + 4x^ay^3 + y^4$ by $x^{2a} + 2x^ay + y^2$

11 Expand by the binomial theorem $\left(2x^2 - \frac{2}{x^2}\right)^4$

12 Solve $\sqrt{2x-2} + \sqrt{x} = \sqrt{6x-5}$

13 The area of a right triangle is 30 square inches; the sum of its base and altitude is 17 inches. Find the base and altitude.

14 Simplify $\sqrt{12a^2} - \sqrt{\frac{3a^2}{4}} + \sqrt[3]{27}$; $\frac{a}{2}\sqrt{\frac{4}{15a}} \times 3a\sqrt{\frac{3}{5a}}$;

$\frac{a+b}{a-b}\sqrt{\frac{a-b}{a+b}}$

15 Define five of the following: simple equation, index, radical, involution, binomial, elimination, pure quadratic.