

High School Department

158TH EXAMINATION

ALGEBRA

Thursday, March 30, 1899—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 $\left(\frac{2}{x} - \frac{1}{a+x} + \frac{1}{a-x}\right) \div \left(\frac{a+x}{a-x} - \frac{a-x}{a+x}\right)$

2 Divide $x^2(y+z) - y^2(x+z) + z^2(x+y) + xyz$ by $x-y+z$

3 Factor $55a^2 - a - 2$, $256 - x^4$, $a^3 - 3a^2 + 1$, $x^2 + y^2$,
 $m^3 - m^2 - m + 1$

4 Solve $\frac{1}{x} - \frac{1}{y} = a$, $\frac{1}{x} + \frac{1}{z} = b$, $\frac{1}{y} - \frac{1}{z} = c$

5 Solve $abx^2 - (a^2 + b^2)x + ab = 0$

6 The denominator of a certain fraction exceeds the numerator by 5 and $\frac{1}{2}$ the numerator plus $\frac{1}{2}$ the denominator is equal to 15; find the fraction.

7 Write out by the binomial theorem the first five terms of $\left(x^3 - \frac{a}{2x}\right)^8$

8 Extract the square root of $4a^2 - 4a^{\frac{3}{2}} + a^3 - 12a^{\frac{3}{2}} + 6a^{\frac{3}{2}} + 9a^{-\frac{3}{2}}$

9 Find the lowest common multiple of $2x^2 - 3x^2 - x + 1$ and $x^4 - x^2 + 2x^2 - 3x - 3$

10 Simplify $\sqrt[n]{\frac{ab}{(a+b)^n}} + \sqrt[n]{\frac{(a-b)^n}{(ab)^n}}$, $\left(\frac{\sqrt{x^2-y^2}}{\sqrt{(x-y)^2}}\right)\left(\frac{\sqrt[3]{(x-y)^4}}{\sqrt{x^2+xy+y^2}}\right)$

11 Solve $\frac{1}{1-x} + \frac{1}{1+\sqrt{x}} - \frac{1}{1-\sqrt{x}} = 0$

12 Solve $\begin{cases} x+y=8xy \\ x^2+y^2=40x^2y^2 \end{cases}$

13 Solve $x\sqrt{x} - 2\sqrt{x} = x$

14 A sum of money at simple interest amounts in three years to \$460; had the principal been $\frac{1}{2}$ greater and the rate 1% higher it would have amounted to \$590. Find the principal and the rate.

15 Define five of the following: *coefficient, exponent, axiom, elimination, reciprocal, evolution, polynomial, root.*