

Tuesday, September 25, 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
$$\frac{\left(\frac{a}{a-x} - \frac{ax}{a^2-x^2}\right) 2x}{\frac{x}{(a+x)^2} - \frac{1}{a + \frac{a^2+x}{2x}}}$$

2 Factor $x^4 + x^2y^2 + y^4$, $1 - (a+c)^4$, $4 - 5a - 6a^2$, $c^3 - a^3 + 3a^2b - 3ab^2 + b^3$, $a^5b - 8lab$

3 Simplify $2x - \{5y - \overline{3z} + 7 - [4 + (x - \overline{5 - 3z} + 2y)]\}$

4 Solve $\frac{2}{x} + y + z = 3$, $\frac{1}{x} + 2y + 3z = 2$, $\frac{3}{x} - 3y + 2z = 11$

5 Solve $x(x-1) - a = -ax$

6 Find the greatest common divisor of $a^4 - a^3 + 8a - 8$ and $2a^3 + 8a^2 - 16a + 48$

7 A fraction is such that if $\frac{1}{4}$ of its denominator be added to 4, the sum is $\frac{1}{2}$ of its numerator; the sum of $\frac{1}{4}$ of the numerator and $\frac{1}{15}$ of the denominator is 3. Find the fraction.

8 Multiply $a^r + a^{r-1}b + a^{r-2}b^2$ by $a^2 - ab + b^2$

9 Expand by the binomial theorem $(2 - \frac{1}{2}x)^5$

10 Extract the cube root of $\frac{1}{x^3} - \frac{3}{x^2} + 5 - 3x^2 - x^3$

11 Solve
$$\begin{cases} x^3 - y^3 = 61 \\ xy^2 - x^2y = -20 \end{cases}$$

12 When the sum of two numbers is multiplied by the greater number the product is 28; when the sum is multiplied by the smaller number, the product is 21. Find the numbers.

13 Simplify $\frac{ab}{y} \sqrt[3]{\frac{-27x^2y^4z^3}{a^2b}}$, $\sqrt{\frac{ab}{2}} \times \sqrt[3]{8ab^2}$, $\frac{2\sqrt{a} - \sqrt{b}}{2\sqrt{a} + \sqrt{b}}$,

$\frac{1}{\sqrt{18}} + 4\sqrt{\frac{1}{2}} - \sqrt{8}$

14 Solve $\sqrt{x+2} - \sqrt{x-6} = \sqrt{2x-10}$

15 Define five of the following: *rationalization, similar radicals, root of an equation, affected quadratic, coefficient, degree of an equation, polynomial.*