

High School Department

165TH EXAMINATION

ALGEBRA

August 1900—Three hours, 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 Define five of the following: trinomial, surd, exponent, elimination, evolution, common multiple, equation.

2 Simplify $x - [ax - \frac{1}{2}\{a + x - ax + x - (x - a)2\}]$

3 Simplify $\frac{\frac{2}{1-a^2} \div (\frac{1}{1-a} - \frac{1}{1+a})}{\frac{1}{2} + \frac{2(a^2 - \frac{1}{4})}{2a+1}}$

4 Factor $a^2 - \frac{3}{4}ay - \frac{1}{4}y^2$, $54x^4 + 16x$, $a^2 + a - 9b^2 + 3b$, $16(a-b)^3 + 2$, $8a^2 - 6ay - 9y^2$

5 Reduce to its lowest terms $\frac{2a^4 - 2a^3 + a^2 + 3a - 6}{4a^4 - 2a^3 + 3a - 9}$

6 The square described on the hypotenuse of a right triangle is 180 square inches, the difference in the lengths of the legs of the triangle is 6; find the legs of the triangle.

7 Expand by the binomial theorem $(\frac{2x}{a^2} - \frac{1}{2})^4$

8 Solve $\begin{cases} x - y = 3 \\ x^2 + 2xy - 3y^2 = 21 \end{cases}$

9 Extract to four terms the square root of $x^2 - 2y$

10 Solve $\frac{3\sqrt{x} - \sqrt{2}}{2\sqrt{x} + \sqrt{2}} = \frac{4 - \sqrt{2x}}{2}$

11 It takes B twice as long as A to dig a ditch; A and C together can dig it in $2\frac{1}{17}$ days, B and C together can dig it in $2\frac{1}{12}$ days. In what time can A, B and C each dig the ditch?

12 Simplify $\sqrt[3]{a^{-1}} \sqrt[3]{b^3} \div \sqrt[3]{b^3 a}$, $\frac{1}{\sqrt{6} - \sqrt{5}} + \frac{1}{\sqrt{5} - 2}$

13 Solve $7x^3 = 8 - x^6$

14 The sum of the contents of two cubic blocks is 407 cubic feet, the sum of the heights of the blocks is 11 feet; find an edge of each block.

15 Divide $x^3 + y^3 + z^3 - 3xyz$ by $x + y + z$