

High School Department

176TH EXAMINATION

ALGEBRA

Monday, January 26, 1903—9.15 a. m. to 12.15 p. m., only

Answer the first four questions and four of the others but no more. If more than four of the others are answered only the first four 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 $12\frac{1}{2}$ credits. Papers entitled to 75 or more credits will be accepted.

1 Factor five of the following: $6a^2 - 11a - 2$, $x^7 + y^7$, $c^6 + y^6$, $1 - (x - y)^3$, $ab - b^2 - a + b$, $2x^2 - 4xy + 2y^2$, $a^{2m} - a^m - 2$

2 Solve $x^2 - \frac{5}{6}x = \frac{2}{3}$

3 Solve $\begin{cases} \frac{x}{2} + 3y = -15 \\ \frac{x}{4} - 5y = 38 \end{cases}$

4 Solve $\sqrt{4x+2a} + 2\sqrt{a} = \frac{8x}{\sqrt{a}}$

5 Find the least common multiple of $6x^3 + 5x^2 - 16x - 15$ and $4x^3 + 4x^2 - 5x - 3$

6 Write out by the binomial theorem the first four terms of $(\frac{a}{2} - 2b)^7$, giving all the work for finding the coefficients.

7 A man by increasing his rate of walking 1 mile an hour gains 4 hours in walking 35 miles; find his ordinary rate of walking.

8 Solve $\begin{cases} x^2 + xy = m^2 + mn \\ xy + y^2 = mn + n^2 \end{cases}$

9 Find the square root of

$$4x^{4a} - 8x^{3a+1} + 4x^{2a+2} + 4x^{2a+1} - 4x^{a+2} + x^2$$

10 The sum of the four sides of a rectangle is 20, the square of the diagonal is 58; find the dimensions of the rectangle.

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

12 Simplify $x\sqrt{xy^3} + \sqrt{\frac{x}{y}} - y\sqrt{x^3y} + \sqrt{xy + \frac{7xy}{9}}$;

$$\frac{3 + \sqrt{5}}{3 - \sqrt{5}} - \frac{3 - \sqrt{5}}{3 + \sqrt{5}}; (\sqrt{x} + y\sqrt{x} - x\sqrt{y} - \sqrt{y})(\sqrt{x} + \sqrt{y})$$