

High School Department

175TH EXAMINATION

ALGEBRA

Tuesday, September 23, 1902—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 Simplify $\frac{1+\frac{x}{x+1}}{x+\frac{1}{1+x}} \div \frac{(x+1)^2-x^2}{x^3-1}$

2 Factor five of the following: $a^2-b^2-c^2+2bc$, $(a+b)^3+1$, $xy+a^2-ax-ay$, $m^2-11m-60$, $27a^3-64$, $1+a^7$, $8x^2+22x+12$

3 Divide 53 into two such parts that the first part divided by the second equals 2 with a remainder 2 .

4 Solve $5x^2-16x=5\frac{1}{4}$

5 Find the least common multiple of $7a^3+4a^2b+4ab^2-3b^3$ and $4a^3-a^2b-ab^2-5b^3$

6 Solve $\begin{cases} \frac{x}{a} + \frac{y}{b} = \frac{a-b}{ab} \\ \frac{x}{b} + \frac{y}{a} = \frac{a^3-b^3}{a^2b^2} \end{cases}$

7 Write out by the binomial theorem the first four terms of $(2a-\frac{1}{3}b)^6$, giving all the work for finding the coefficients.

8 A man can row down a river at the rate of 8 miles an hour, but takes twice as long to row a mile up the river as to row a mile down the river; find his rate of rowing in still water and the rate of the stream.

9 Solve $\begin{cases} x+y=7 \\ x^{\frac{1}{3}}+y^{\frac{1}{3}}=1 \end{cases}$

10 Solve $\sqrt{x+7}=4\sqrt{x+2}-5\sqrt{x-1}$

11 There are two numbers such that the product of the first and 1 more than the second is 306; the product of the second and 1 less than the first is 272. Find the numbers.

12 Simplify $(\sqrt{1-2x+1})^2$; $\sqrt[3]{\frac{1}{16}}-\sqrt[3]{32}+\frac{1}{4}\sqrt[3]{2^2}+\frac{1}{2}\sqrt[3]{16}$; $\frac{3-\sqrt{3}}{3+\sqrt{3}}$