1893 High School Examination

ALGEBRA

Tuesday, September 27, 1904—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 all operations (except mental ones) necessary to find results. Reduce each result to its simplest form and mark it Ans. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.

1 Simplify $\dfrac{a^2+1}{\dfrac{a+1}{a+1-\dfrac{a^2+1}{a+1}}-1}$

2 Factor *five* of the following: $10x^2+11x-6$, $a^{2x}-2a^x+1$, b^3-a^3+2a-1, x^3-y^3, $2a+x-2a^2x-ax^2$, a^4+a^2+1, a^5+b^5

3 Solve $3-\dfrac{2}{x}=\dfrac{6}{x+1}$

4 Simplify $\sqrt{\frac{1}{3}}+\frac{1}{3}\sqrt{20}-\frac{1}{5}\sqrt{45}$; $(2\sqrt{a}-b)(a+2\sqrt{b})$; $\dfrac{2-\sqrt{2}}{2+\sqrt{2}}$

5 A who travels 4 miles an hour, starts from a certain place 2 hours in advance of B who travels 5 miles an hour in the same direction; how many hours must B travel to overtake A?

6 Solve $\begin{cases} \dfrac{1}{x}-\dfrac{2}{3y}=\dfrac{1}{12} \\ \dfrac{1}{2x}+\dfrac{3}{2y}=\dfrac{1}{2} \end{cases}$

7 Solve $\sqrt{3x}-\sqrt{x-3}=3$

8 A certain sum of money is divided among A, B and C, so that A and B together have as much as C; the sum of B's share and C's share is $175 and C has $50 more than A. Find the share of each.

9 Solve $\begin{cases} x^3-y^3=56 \\ x^2+xy+y^2=28 \end{cases}$

10 Expand to *four* terms by the binomial theorem $\left(2a-\frac{y}{2}\right)^5$, giving all the work for finding the coefficients.

11 Multiply $a^{x+1}+a^x+a^{x-1}$ by a^2-a+1

12 The sum of the areas of two squares is 58 square inches; the area of the rectangle whose base and altitude are equal respectively to the sides of the squares, is 21 square inches. Find the dimensions of the rectangle.