

High School Department

164TH EXAMINATION

ADVANCED ARITHMETIC

Monday, June 11, 1900—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but no more. If more than 10 are answered only the first 10 answers will be considered. Give each step of solution. Express final result in its simplest form and mark it *Ans.* Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.

1 State the relations between the unit of length, the unit of capacity and the unit of weight in the metric system. Show the advantage of this system because of these relations.

2 Convert 423,501 to an equivalent number in the senary scale.

3-4 In extracting square root, show why *a*) the number is separated into periods of two figures each, *b*) twice the root already found is used as a trial divisor, *c*) the trial figure of the root is added to the trial divisor.

5 Simplify $\frac{2}{3} \times 1.36 - 2.111 + 3.1253$

6 Find *a*) the greatest fraction that will be exactly contained in $\frac{1}{2}$ and $\frac{1}{3}$, *b*) the least fraction that will exactly contain $\frac{1}{2}$ and $\frac{1}{3}$.

7 A sphere 4 inches in diameter weighs 9 lbs.; find the weight of a cone of the same material whose base is 8 inches in diameter and whose altitude is 15 inches.

8 Find the candle-power of a lamp that, at a distance of 15 feet, gives the same intensity of light as a lamp of 16 candle-power at a distance of 12 feet.

9 From a 10 gallon cask containing 7 gallons of wine and 3 of water 4 gallons are drawn and the cask refilled with water; what is the per cent of wine in the resulting mixture?

10 Compare the six per cent method of computing interest with the method of computing exact interest. Show which method is usually more favorable to the borrower.

11 A speculator buys through a stock-broker 50 shares of O & W at $23\frac{1}{2}$, depositing \$5 a share as margin; at the end of one month the stock is sold at $24\frac{1}{2}$. If brokerage is $\frac{1}{2}\%$ in each case and the speculator pays interest at 6% on the balance of purchase price, how much is due the speculator?

12 When it was 1 a. m. Jan. 1, 1900 at San Francisco, longitude $122^{\circ} 25'$ west, what was the day and the hour at Yokohama, longitude $139^{\circ} 40'$ east?

13 Consider the decimal .333 etc. as a descending geometric series, and find its exact value expressed as a common fraction.

14 Extract the cube root of 2461 to two decimal places.

15 Define *arithmetic progression*, *annuity*, *commercial paper*, *involution*, *quinary scale*.