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*University of the State of New York*

**Examination Department**

138TH EXAMINATION

# ADVANCED ARITHMETIC

**Monday,** June 15, 1896—9:15 a. m. to 12:15 p. m., only

100 *credits, necessary to pass,* 75

*Answer to questions but* **no more.** *If more than 10 questions are answered only the first 10 of these answers will be considered. Division of groups is not allowed. Give each step of solution, indicating the operations by appropriate signs. Use cancelation when possible. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits.*

1 Define *dividend, ratio, root, arithmetic series, partitive proportion.*

2–3 Reduce $\frac{7}{12}$ and $\frac{5}{18}$ to fractions whose common denominator is 36; to fractions whose common denominator is 42. Give a full analysis of each step of the process.

4 Prove that the excess of 9's in the product of two numbers is equal to the excess in the product of the excesses in the two factors.

5 What will it cost to dig a well 3 feet in diameter and 30 feet deep, when every cubic yard of earth that is thrown out costs $4?

6–7 Prove that the product of any three consecutive numbers is divisible by 6 or by 24. Determine when it is divisible by 6; when it is divisible by 24.

8 The greatest common divisor and the least common multiple of two numbers between 100 and 200 are respectively 6 and 3150; find the numbers.

9–10 Derive a rule for marking goods so that a given reduction may be made from the marked price and a given profit still be made on the cost.

11 Prove that the difference of the squares of any two odd numbers is a multiple of 8.

12 A merchant buys goods to the amount of $4000; in order to pay for them he gets his note for 60 days discounted at a bank. If the face of the note is $4033.613, what is the rate of discount?

13–14 Prove that the exact interest of any sum for a given number of days is equal to the interest of the same sum for the same number of days (as usually computed), diminished by $\frac{1}{73}$ of itself.

15 The diameters of four spheres are as 3.75, 5, 6.25 and 7.5; prove that the volume of one of them is equal to the volume of the remaining three.