

ADVANCED ARITHMETIC

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

Answer eight questions but no more. If more than eight are answered only the first eight answers will be considered. Give each step of solution. Express final result in 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 Find the exact value of $.25\bar{3} + .018\bar{5} \div .1\bar{6} - .\bar{3}\bar{3}$ and express the result both as a common fraction and as a circulating decimal.

2 How much will the product of two numbers be decreased by decreasing each of the numbers by one? Give a general proof.

3 A merchant sold $\frac{1}{4}$ of an invoice of goods at a loss of 15%; he then sold the remainder so that his gain on the whole transaction was 15%. Find the merchant's per cent of gain on the latter sale.

4 Multiply 45,732 by 5236 and prove the correctness of your result by *two* different methods. Show why the method of proof by casting out nines is not an infallible test of correctness.

5 If $\frac{9}{11}$ of a bushel of peaches costs \$1.80 what will $\frac{7}{10}$ of a bushel cost? Solve by proportion and demonstrate the principle on which the operation is based.

6 A man invested \$526.50 for one year in three different amounts at 3%, 4% and 6% respectively, so that the same interest accrued from the three sums invested; find the amount of each investment.

7 A merchant is offered on a bill of \$5680 six months credit or a discount of 2% and 2% for cash. He borrows the money for six months at 5% and discounts the bill; by so doing how much less will he have to pay at the date of the maturity of the bill?

8 How was our unit of length originally determined? Show the relation to this unit of our unit of (a) area, (b) volume, (c) capacity (liquid measure and dry measure).

9 A cylindric milk-can, 1 meter in height and 6 decimeters in diameter, is full of watered milk which weighs 1.02 times as much as water; pure milk weighs 1.03 times as much as water. Find the number of kilograms of water added to the pure milk.

10 The first term of a series of 16 terms is $16\frac{1}{2}$; the sum of the series is $4117\frac{1}{4}$. Find the common difference.

11 What weight, 6 feet from the fulcrum, will balance two weights of 12 pounds each which are respectively 4 feet and 2 feet from the fulcrum and on the other side of it? [Two weights that balance each other are inversely proportional to their distances from the fulcrum.]

12 The base and altitude of a triangle are respectively 6 feet and 4 feet; find the base and the altitude of a similar triangle whose area is 20 square feet.