Answer eight questions but no more. 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. Prove that the difference between the squares of any two consecutive numbers is an odd number. [A simple illustration is not proof.]

2. Apples are bought at the rate of 5 for 2½; one half of them are sold 2 for 1¼, and the rest 3 for 1¾. If 1½ is made by the whole transaction, how many apples are bought? Give full analysis in words.

3. Prove that on a bill of goods a trade discount of a%, b%, and c% is the same in whatever order the discounts are taken.

4. If a grain dealer uses for a half bushel measure one that holds but 15 quarts, what is the dealer’s per cent of gain? What is the customer’s per cent of loss? Explain.

5. A and B have the same income; A saves % of his but B by spending $125 a year more than A, finds himself $100 in debt at the end of 4 years. How much does each spend annually? Give analysis in words.

6. How many quarts does a pail hold that is 1 foot in diameter at the top, 10 inches in diameter at the bottom and 9 inches deep?

7. If stock bought at 20% premium pays 5% on the investment, what would it pay if bought at 20% discount? Explain.

8. Prove that the number of places in the repend of a circulating decimal must be less than the number of units in the denominator of the common fraction from which it is derived.

9. A and B hire a pasture for $60; A puts in it 9 horses and B 12 cows for the same length of time. If 3 cows eat as much as 2 horses, how much ought each to pay? Write full analysis in words.

10. A sum of money placed at interest for 1 year 6 months amounted to $2696.875; if it had remained at the same rate of interest for 2 years, it would have amounted to $2763.50. Find the rate of interest.

11. When the mercury in the barometer is 30 inches high, the pressure of air is 15 pounds to a square inch; find the pressure on a pane of glass 2 feet square when the mercury column is 28 inches high.

12. Find correct to three places of decimals the length of the longest rod, pointed at each end, that can be put into a box 3' x 4' x 1'.