

**ARITHMETICAL PROBLEMS, OR
QUESTIONS IN ARITHMETIC,
FOR THE USE OF ADVANCED
CLASSES IN SCHOOLS**

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Arithmetical Problems, or Questions in Arithmetic, for the Use of Advanced Classes in Schools
by W. H. Farrar

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QUESTIONS IN ARITHMETIC,

FOR THE USE OF

ADVANCED CLASSES IN SCHOOLS.

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PREFACE.

THIS work is not designed to take the place of any other, but to supply an actual deficiency. There is no want of excellent text-books of arithmetic, in which the principles of the science are all explained, and abundantly illustrated. Indeed, everything is made so plain and simple that a sufficient field for original, independent investigation is hardly afforded. But little necessity for mental exertion being imposed upon the pupil, he naturally, in the use of such books alone, thinks but little. Hence the very general complaint that scholars, from our schools, on entering into business that requires mathematical calculation, do not possess the requisite knowledge of the subject to render them immediately useful. Frequent references must be made to text-books, or an effort must be made to recollect the rule, and to determine what rule applies in each particular case.

They are obliged to proceed in this manner until, by necessity, that knowledge is acquired in the workshop, or the counting-room, that should have been acquired in the school-room.

That such complaints are not entirely groundless, every business man knows full well. It is hoped that the little volume now offered to the public will contribute, in some measure, to the necessary improvement in this respect.

It is the design of this work, by the absence of all rules and explanations, to throw the pupil back upon his own mental resources; to impose upon him the necessity, or at least afford him the opportunity, of patient investigation, and close and vigorous application of thought, and to induce him to feel that he, as well

as others, is endowed with the requisite mental capacity for such labor.

The questions are generally of a practical nature; yet many that are not so have been introduced, for the purpose of developing and strengthening the power of analysis. Such questions will be found eminently useful in promoting readiness and quickness of perception.

The author has endeavored to avoid producing that weariness of the subject, that a multitude of questions, little varied in their character, depending on the same principle, invariably produces. He has endeavored to arrange the questions so that novelty shall contribute to the interest of the pupil. The same principle, however, recurs again and again, but after such intervals as will not be likely to render it an unpleasant or unwelcome acquaintance.

Some of the principles that lie at the foundation of mensuration will be found on the opposite page, being inserted for the benefit of such teachers as are not familiar with geometry.

It is recommended that teachers in the use of this work should avoid, as far as practicable, solving the questions for the pupil. Let the class, in going through for the first time, omit such questions as they cannot solve, marking them for another trial. Let the pupil be required to explain the principles on which the solutions depend; and, when the question is capable of several solutions, let them be given, and determine which is preferable.

To all such teachers as are desirous of seeing their pupils independent, ready and thorough arithmeticians, this work is most respectfully dedicated.

W. H. FARRAR

WOODBURY, N. Y., Dec. 10, 1852.

GEOMETRICAL PRINCIPLES.

1. A TRIANGLE is one half a rectangle having the same base and the same altitude.

2. A pyramid, or cone, is equal to one third of a prism, or cylinder, having the same base and the same altitude.

3. Bodies that have the same shape are similar.

4. All similar surfaces are to each other as the squares of their like dimensions.

5. The solidities of all similar bodies are to each other as the cubes of their like dimensions.

6. The ratio of the circumference to the diameter of a circle is nearly 3.1416.

7. The circle may be considered as made up of an indefinite number of triangles, having their apexes all at the centre, their united bases forming the circumference.

8. The side of a hexagon, inscribed in a circle, is equal to the radius of that circle.

9. The convex surface of a globe is equal to four circles of the same diameter.

10. The globe may be considered as made up of an indefinite number of pyramids, having their apexes in the centre, their united bases forming the convex surface.

11. If a be any number, and $b + c = a$, c being less than b , then

$$\sqrt{\left(\frac{a}{2}\right)^2 - bc} = \frac{a}{2} - c, \text{ and also, } b - \frac{a}{2}.$$

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ARITHMETICAL QUESTIONS.

1. At \$15.50 per ton, what is the value of one cwt. of hay? *Ans.* 77½ cents.

2. What number is that which, being divided by 2½, will give ¾?

3. A man divided a ton of coal between two poor families, giving one ¾ as much as the other. How much did each receive?

Ans. One 6 cwt., the other 14 cwt.

4. If 20 per cent. of what I receive for my goods is gain, what is my gain per cent. ? *Ans.* 25 per cent.

5. If a man, who owns ¾ of a house, sells ¼ of his share for \$600, what is the value of the whole house?

Ans. \$3500.

6. A gentleman, having \$50, paid, in Boston, 10s. 6d. for a pair of shoes, 15s. for a hat, \$25.37½ for a coat, gave 4s. 6d. to some beggars, and paid 7s. 6d. at his tavern. How much had he left? *Ans.* \$18.37½.

7. A man purchased 25 shares in the Concord Railroad at 12½ per cent. below par, and sold the same at 12½ per cent. above par. What did he gain per cent., and what in all, the par value being \$50?

Ans. 28½ per cent.; \$312.50 in all.