ELEMENTS OF ARITHMETIC: FOR PRIMARY AND INTERMEDIATE CLASSES IN PUBLIC AND PRIVATE SCHOOLS

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BY

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MILNE'S MATHEMATICS

MILNE'S ELEMENTS OF ARITHMETIC

MILNE'S STANDARD ARITHMETIC

MILNE'S MENTAL ARITHMETIC

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MILNE'S PLANE AND SOLID GEOMETRY

MILNE'S PLANE GEOMETRY—SEPARATE

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PREFACE.

THIS work has been prepared to meet a demand for a book that contains, within brief compass, an elementary course in arithmetic. It is also designed to be an introduction to the more thorough and exhaustive treatment of the science which is given in the author's STANDARD ARITHMETIC.

The first part of the book contains exercises arranged in such a manner that they secure an easy and natural development of the ideas of numbers, and they afford sufficient practice to fix the results in memory. Ready knowledge of results can be secured only by frequent repetition and thorough drill, and the lessons that have been prepared are believed to be admirably adapted to produce expertness in computing, without sacrificing interest in the subject through constant practice with abstract numbers.

When the more systematic treatment of the science is presented, the pupil is led by natural, progressive, and logical steps to an understanding of the definitions, principles, processes, and rules, before he is required to state them; consequently, all definitions, principles, and rules are but the expressions of what he already knows. It is evident, therefore, that the plan pursued in the work will develop in the student the habit of investigating for himself any subject which may claim his attention, and this is an extremely important part of proper teaching.

The number of oral examples is large enough to supply all the necessary training in "mental" arithmetic, and the frequent exercises for review will fix in the memory all the knowledge of the science that has been acquired. The treatment of the subjects has been adapted to the comprehension of young pupils, and subjects which are too difficult for them have been omitted; and yet in no instance has accuracy of statement or correctness of process been sacrificed in what has been presented.

Though the treatment of the subjects is brief and elementary, a student who goes no farther in his arithmetical studies than this work will take him, will have a knowledge of the science, sufficient to enable him to perform, with accuracy and intelligence, most of the processes required in ordinary business life.

The author desires to express his indebtedness to George I. Aldrich, A.M., Superintendent of Schools of Newtonville, Mass., for valuable aid in the preparation of the earlier parts of the book, and for important suggestions upon the treatment of subjects throughout the work. His reputation as an originator of rational and scholarly methods of teaching arithmetic is a guarantee of the value of his services.

"The Elements of Arithmetic" is submitted to the public with the hope that it may prove to merit general favor on account of the natural and rational development of the subject, and because of its peculiar adaptation to the class of students for whose use it was written.

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SUGGESTIONS TO TEACHERS.

1. It must be borne in mind that the pupils should first be made familiar with the combinations of numbers, before any explanations or analyses are required.

2. The first part of this book is designed to give pupils the knowledge of numbers; and it is suggested, therefore, that the teacher ask for results only.

3. If explanations of processes or analyses of problems are required, they will divert the attention of the pupils from the results, and thus hinder their progress.

4. The lessons which are given are designed to be typical rather than complete, and the thoughtful teacher will devise additional problems of a character similar to those given in the book.

5. By going over the same lessons frequently the pupil will become familiar with numbers; but there is only one way in which thorough knowledge of numbers can be acquired, and that is by repetition of the combinations within brief intervals of time.

6. The examples should at first be given in connection with objects which can be conveniently obtained. From these the transition is easy to concrete examples, in which the splints, or counters, or buttons, or beans, stand for other

units; but too early drill upon abstract numbers is unfavorable to the development of a proper comprehension of arithmetic, and makes the pupils mechanical rather than thoughtful.

7. It will be found advantageous to encourage the pupils to form examples for themselves. Such a plan gives a pleasing variety to the work of the class, and makes the pupils thoughtful regarding the work. Judicious use of this suggestion will aid in inspiring interest in the work.

8. The work upon the slate, or written work, should come only after the oral work, and it should be given only for purposes of review after the numbers have been thoroughly understood.

9. Care should be taken with the written work, that the children make the figures in accordance with proper models, and that everything is done neatly.

10. Be sure to require the students to answer all the development exercises which precede every subject. These exercises will cause the pupils to apprehend the principles that are employed in the solution of the problems that follow, and they will discourage the tendency on the part of the children to give mechanical or formal solutions.

11. Do not fail with every lesson to review the work of previous days, for it is only in this way that pupils become familiar with results and processes, and success in arithmetical processes is dependent to a great degree upon constant *drill*.

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