

**HARPERS' GRADED ARITHMETICS.
FIRST BOOK IN ARITHMETIC,
COMPRISING TWO YEARS OF
ORAL AND WRITTEN WORK IN
THE ELEMENTS OF NUMBERS**

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Harpers' Graded Arithmetics. First Book in Arithmetic, Comprising Two Years of Oral and Written Work in the Elements of Numbers by Various

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PREFACE.

WHATEVER instruction in numbers is given to children in the beginning of their school course should be oral, and purely objective. Oral instruction usually continues through about two school years, or until the children can read readily and intelligently in a Second Reader.

This book is intended for the third and fourth years in a school course; and is the first of a series of two books embracing a complete course in arithmetic, both oral and written, for schools below the high-school grade.

Oral and written work are combined throughout the book. Pages 9-59 contain work for one year; and pages 61-140 contain work for a second year. The lessons in the first ten numbers embrace all the possible combinations that form these numbers; numerous practical applications; and the use of the necessary signs and terms. The lessons on these ten numbers are arranged as follows:

I. **INDUCTION.**—In these introductory lessons the child is made familiar with each number as made up of ones, with its relation to the preceding number, and to the number *one*.

II. **MEASURING.**—In these lessons every possible combination that forms the number, all of the relations of the number to each number smaller, and the equal fractional parts of the number are brought out by questions on the objective plan.

III. **TABLE.**—Having formed all the combinations that produce the number, an outline for the table of these combinations is given, which is to be filled up, learned, and recited by the pupil.

IV. **COMPARISON.**—In these lessons the pure or abstract number is compared, in all possible ways, with all less numbers.

V. COMBINATIONS.—In these exercises all the pure numbers that have formed the subjects of previous lessons are variously combined, the result of no combination exceeding the number which forms the subject of the lesson.

VI. APPLICATIONS.—These consist of exercises or problems in applied or concrete numbers, no result being greater than the number which forms the subject of the lesson.

WRITTEN WORK.—This includes the outlines for the tables of combinations, and numerous exercises and problems for slate and blackboard work.

In brief, the lessons, in their order, on each of the ten numbers are—I. Induction; II. Measuring; III. Constructing Table; IV. Comparison; V. Combinations; VI. Applications.

The lessons on the numbers 10–100, pages 61–77; and on the numbers 100–1,000, pages 79–99, are arranged on the same general plan as those in the first ten numbers, the advancement being more rapid, to keep pace with the constantly increasing abilities of the child. Pages 100–140 make the child familiar with the written processes of notation, addition, multiplication, subtraction, and division of numbers less than one billion—including United States money,—and give him a large amount of practice in both oral and written work.

MODELS OF WORK.—Models are given of slate and blackboard work, and of oral explanations and solutions, suited to the age and advancement of the pupils.

Instruction in the elements of numbers, in accordance with the plan developed in this book, will give to children—

1. Ability to write, read, and use numbers less than one billion;
2. Knowledge of all the tables of elementary combinations;
3. Facility in giving oral and written solutions of questions in integers and United States Money; and
4. Familiarity with the fundamental operations of written arithmetic, and a thorough preparation for the study of the Second Book in Arithmetic.

SUGGESTIONS TO TEACHERS

On pages 5, 6, 7, 60, 78, 100, and 121 are suggestions on points which require special attention, and which can be referred to in this way better than in the text of the book. It is not intended to prescribe forms and methods, but to offer a few hints to aid in the successful use of this book.

Assigning Work.—The activity of child nature demands that the child have employment. Therefore, with every lesson assigned, give the pupil work to do at his seat, and give him all necessary instruction how to do that work. *Tell him what to do*, and, if necessary, *show him how to do it*.

Written Work.—Give particular attention to all the written work of the pupil. See that his slate is properly ruled before he begins written work, and inspect the work after he has finished it.

Class Work.—Devote a portion of the time of each recitation to an animated drill upon impromptu exercises similar to those contained in the lesson for the day. Test the comprehension of the pupil by familiar questions similar to those contained in the text of the lesson. Illustrate on the board, by lines and diagrams, questions that admit of such illustration, and then require the pupil to do the same.

Use of Books in Class.—Pupils encounter more difficulty in arithmetic from inability to read correctly than from any other cause. To become good arithmeticians, they must read *understandingly*. No amount of reading *for* them, or *to* them, or explanation by the teacher, can make good the inability to read *intelligently*. Therefore, require each pupil to read from the book, in the class, the exercises of the lesson, and then to state orally the meaning of what he has read.

Forms of Answer.—Require only brief answers to the questions in applied, or concrete, numbers. Always require pupils to answer in complete sentences and in correct language. Whenever you can give a better form of answer than is found in the book, adopt it; but before doing this, be sure that it is better, both for the particular question or kind of questions, and for the pupil or class.

Oral Instruction.—Impromptu oral exercises should be either—

- 1st. To prepare the pupil for a lesson to be learned from the book; or,
- 2d. For drill in connection with a lesson or recitation; or,
- 3d. To test the pupil's knowledge of subjects already passed over—*i. e.*, for review or examination.