

**ARITHMETIC BY GRADES,
FOR INDUCTIVE TEACHING,
DRILLING AND TESTING,
BOOK NUMBER SIX**

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Arithmetic by Grades, for Inductive Teaching, Drilling and Testing, Book Number Six by John T. Prince

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JOHN T. PRINCE

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AND TESTING

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*Mensuration, Denominate Numbers, Metric System, Percentage
and Simple Applications, Business Trans-
actions and Accounts*

PREPARED UNDER THE DIRECTION OF
JOHN T. PRINCE

BOSTON, U.S.A.
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1895

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NOTE TO TEACHERS.

THE attention of teachers is called to the following features of this series of books—features which should be kept in mind as the various subjects are presented.

1. The separation of teachers' and pupils' books, whereby pupils may be taught properly and may not be given too great assistance. Suggestions as to methods of teaching and drilling, as well as the illustrative processes, explanations, rules, and definitions which belong to the teacher to develop analytically are put into the Teachers' Manual, while in the pupils' books are presented only such exercises as are needed for practice.

2. The careful gradation of problems, by which pupils acquire inductively a knowledge of arithmetical relations and principles, and skill in arithmetical processes. This is in recognition of the well-known pedagogical principles of proceeding from the known to the unknown, and from the simple to the complex. It is advised that this plan be kept constantly in mind by the teacher, and that whenever a process is not understood or is not readily performed, the pupils should be taken back to processes which are well known and which can be performed readily, and then should be led forward by easy steps until the desired end is reached.

3. Frequent reviews, and such an arrangement of exercises as will enable pupils to have needed practice in the applications of each principle, first by itself, and afterwards in connection with other principles which have been learned.

4. The large amount of oral work, or work which may be done without the aid of figures. Three objects of Mental Arithmetic are sought in these exercises: (a) Illustration of principles and a preparation for written work, (b) Development of the logical powers, (c) Cultivation of ability to work with large numbers by short processes.

A clear statement of steps in brief formulas should be insisted upon until the principle or process is thoroughly known. Such statement should include what is asked for in the problem and the conditions that are given. The solution of problems by short processes and "on a line" by cancellation should be encouraged when the problems are not difficult.

It will be observed that an exhaustive study of the applications of percentage is not called for at this stage but only a study of the more general and simple applications which are likely to occur in business. A fuller and more systematic presentation of Interest, Profit and Loss, Banking, Insurance, etc. is made in the next book.

The problems given in the last three pages of the book indicate a kind of work which may be done profitably in connection with other subjects of instruction.

For methods of teaching the various subjects and for answers to problems see Teachers' Manual which is designed to accompany all books of the series.

5. The great number and variety of problems. The aim has been to give the *largest number* of problems that will be needed for teaching and for drilling in all grades. For this reason, and because the forms of expression are varied, being taken from many sources, there will be no necessity of giving supplementary drill lessons on the blackboard. Blackboard lessons are objectionable not only on account of a waste of the teachers' time and strength, but also on account of the injury done to pupils' eyes in much reading and copying from the blackboard.

6. Practicalness of work in respect to the character of the problems, and the solution of them. Care has been taken to give problems which are most likely to be met in every-day life, and to give them in a practical form. Many of the miscellaneous review problems were made by mechanics, clerks, accountants, etc., with a view of presenting conditions most likely to occur.

7. The introduction of statistics and facts of physics, astronomy, history, geography, etc., thus enabling pupils to gain incidentally much useful information.

8. The use of drill tables and other devices to save the time of teachers.

In addition to the above features, some of which are distinctively new so far as American text-books are concerned, there is the separation of pupils' exercises for practice into small books somewhat on the lines of gradation in City graded schools. By this arrangement there are gained greater convenience of handling and economy of wear than in the use of a large book which is intended to be used for several years by the same pupil.

The problems of Section I of this book are given as a review of previous work. Little time need be given in drill upon them, if the work of previous books has been thoroughly done.

The continued use of objects in teaching Mensuration and Denominate Numbers is strongly advised as well as the pupils' practice of drawing in the illustration of problems, especially when such drawing will tend to make clear an unfamiliar or difficult process. Since the Metric System of Measures and Weights is not in common use, it is not necessary to give very extended or long continued practice in it. Yet enough of practice should be given to show the pupils the great advantage of simplicity and economy of time that it has over our complex system.

A clear statement of steps in brief formulas should be insisted upon until the principle or process is thoroughly known. Such statement should include what is asked for in the problem and the conditions that are given. The solution of problems by short processes and "on a line" by cancellation should be encouraged when the problems are not difficult.

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