A PRIMARY ARITHMETIC: NUMBER STUDIES FOR THE SECOND, THIRD, AND FOURTH GRADES

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A primary arithmetic: number studies for the second, third, and fourth grades by A. R. Hornbrook

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A. R. HORNBROOK

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PRIMARY ARITHMETIC

NUMBER STUDIES

FOR THE SECOND, THIRD, AND FOURTH GRADES

BY

A. R. HORNBROOK, A.M.

TEACHER IN THE PUBLIC SCHOOLS OF EVANSVILLE, IND.

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PREFACE

THE progress of a beginner in arithmetic is of a desirable kind when it involves a succession of insights into the relations of numbers and an increase of expertness in dealing with them. It is the aim of this first book to secure these ends. Its material has been chosen with careful reference to the development of the number sense of little children as observed by the author and as reported by many other observers.

It is believed that when a child realizes the meanings of the first ten number names, has learned to make combinations within 10, and is able to count to 100, he is ready to take up the first hundred as an aggregation of tens, to consider other numbers as aggregations, and to discover their relations. At that point this book begins.

The use of diagrams called "number tables" as a concrete basis for the child's thinking while he is getting his first ideas of the facts of the addition and multiplication tables is a distinctive feature of the work. Children readily learn from a number table like that on page 14 such facts as "5 tens = 50." The five columns of numbers are as concrete to them as five sticks, and the figures "50" at the end of the fifth column make them much more suggestive. Much of the work given in this book would be entirely too difficult for the children for whom it is intended if it lacked the basis of the measurements of the number tables.

5 4 1 3 4 4

The treatment of numbers used in this book leads to the presentation of the multiplication tables in an order different from that usually followed, and more economical of children's time and effort. 10, "the master key of number," under the decimal system, is presented first with its multiples. The child's instinct for grouping by pairs is next utilized by giving the table of twos. Work in addition and subtraction follows in which the relations of numbers to 10 and to 2 are frequently brought to mind. By objective work in feet and yards illustrating combinations in addition, the pupil gains a knowledge of multiples of 3. The smaller multiples of 4 are learned by similar work upon quarts and gallons, pecks and bushels. The fives as a subdivision of the tens are presented in the next chapter, and in order that the child may have time to become familiar with the multiples of 5, most of the work of that chapter relates to them. The child has been dealing with 10 and its divisions, and has had much practice in combining 10 with other numbers. To learn the table of elevens is an easy task for him. One little fellow remarked, "Learning the table of elevens is just like going down stairs, and you can always tell what step you are on. The first step is made of 1's and the second step is made of 2's, and it is that way all the way down." A glance at the oblique line made by the multiples of 11 in the number table on page 114 will explain his remark. 9, as a departure from 10 on the other side, is next given. The table of nines is reënforced by that of the threes, which receives formal treatment in the next chapter. The treatment of 8 is followed by that of its subdivision 4.

Work in fractions, which is generally so successful in first grades, is continued throughout the book in connec-

tion with simple geometric forms, and leads naturally to the recognition of ratios.

Only the rare, precocious child is able to found a process upon a course of reasoning, however clearly it may be presented. For that reason, only those processes of written work that can be based upon the child's intuitions of number are accounted for; others are given simply as processes leading to desired results, without any attempt at forcing a knowledge of the underlying principles into the immature mind. The child is led to construct, to observe, to report, and to remember, but the reasoning required of him in the first book is limited to simple inferences.

Formal analysis, that most effective deadener of the mathematical sense of little children, has been omitted. The successful teacher knows how to stimulate the expression of the child's own insights into number by light, skillful touches upon his mind in easy conversational exercises.

The development of the plan of the work is indicated by many notes to the teacher.

To the many primary teachers who have kindly contributed the results of their schoolroom experiences, the author offers grateful acknowledgments.

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