

**CHILDREN'S ARITHMETIC BY  
GRADES; GLOBE SERIES;  
SECOND BOOK, THIRD YEAR;  
FUNDAMENTAL OPERATIONS**

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Children's Arithmetic by Grades; Globe Series; Second Book, Third Year; Fundamental Operations by William E. Chancellor

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**WILLIAM E. CHANCELLOR**

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*CHILDREN'S ARITHMETICS BY GRADES*

*GLOBE SERIES*

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# SECOND BOOK

THIRD YEAR

## FUNDAMENTAL OPERATIONS

BY

WILLIAM E. CHANCELLOR, A.M.

SUPERINTENDENT OF SCHOOLS, BLOOMFIELD, N.J.



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"The proper use of the printed page is the greatest of all arts taught in the school. How to get out of printed words and sentences the original thought and observation recorded there — how to verify these and critically go over the steps of the author's mind — this is the method of discovery, and leads to the only real progress."

W. T. HARRIS, LL.D.,  
*United States Commissioner of Education.*

— *From Address before the National Educational Association, 1896.*

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## PREFACE

THIS book is intended for boys and girls who know the numbers from one to thirty thoroughly, who can count to one thousand, who know something of the multiplication tables of two, three, four, five, six, ten, and twelve, and who understand the simplest facts about ratio and fractions. For such boys and girls there is here about a year's work.

How should boys and girls study numbers? The interrelations of number-facts and of number-principles are such as to make progress very slow and very difficult through their intricate maze. Is there any Ariadne's thread to follow through the labyrinth of numbers?

Is number ratio or counting? Is it comparison, or magnitude, or multitude? Is it a logic of thought, which can be analyzed after the topical style,—addition, subtraction, multiplication, division, rule of three, and so forth,—of which we may complete one part before beginning the next? Shall we learn every discoverable fact about twenty before taking up twenty-one, or every conceivable fact about  $\frac{1}{2}$  of  $\frac{2}{3}$  of  $\frac{3}{4}$  of  $\frac{4}{5}$  before taking up liquid measure?

This book is both "topical" and "spiral" in plan. Its substance is both ratio and counting. Its purpose is to conform numbers in their facts and principles to the usual processes and powers and interests of children's minds. The graded reader has opened the way for the graded arithmetic. Grading all books is part and parcel of the new education, which means to discover and to obey the facts of the child-mind, its methods, nascent periods, and order of growth.

The core of the concentric theory is recognition of the value of finding something that is known even in the mass of the unknown. Let us not hesitate in schoolbooks as we do not hesitate in life to branch out into the new and to return again to the old. Because ratio is the root and numbering is the top, let us not forget reasoning, which is the main trunk of arithmetic. The child's knowledge of arithmetic should grow as evenly in all directions as the most careful and the most open-minded education can secure.

Progress in education is largely a matter of progress in power to

understand books. Oral instruction may be continued too long as the sole medium for imparting knowledge. This book is rather for reading and study than for the setting of many exercises in writing figures. It calls for oral expression far more than for written work; but it is meant to call most for the quiet, studious effort of the child to think through the number-processes for himself in the light of the instruction of the teacher and of these pages. Many minds, of adults as well as of children, cannot at once comprehend principles and facts explained orally. We often need to see the printed words, and slowly and patiently to think out their truth and meaning for ourselves. We remember with more than twofold certainty what we have verified for ourselves after hearing from others.

We cannot advance far in mathematics without giving ourselves to symbols wholly. No one can add 50 and 40 with the picture of 90 real objects in his imagination. In this book we are at the stage where we can properly think of 15 as a symbol only; hence we begin to use the singular verb in the English sentences, — 15 is what part of 50? and, 15 is 50 less?. Yet while this treating of numbers abstractly is essential to progress in arithmetic, considered either as the science of numbers or as the art of computation, we must remember that we study arithmetic not only for culture, but also for utility. In our teaching we must frequently correlate numbers with real facts. This is especially necessary in our dealings with arithmetic as ratio. Our boys and girls must know quarts, yards, pounds, coins, square feet, as actual measures. To encourage interest in arithmetic as truth about real things, pictures and illustrations, tending to stimulate the activity of the imagination which gives men seeing eyes, have been introduced.

Arithmetic is the chief instrument of science and the essence of certainty. It is concrete logic. In a world of flux and change and doubt it is of elemental importance for our boys and girls to know a kind of truth that is as positive as the very reason and the very mind of our humanity.

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Author and publishers desire to acknowledge the valuable suggestions of Principal W. B. Gunnison, Ph.D., of Erasmus Hall High School, Brooklyn, N.Y., in reviewing these pages.

W. E. C.

BLOOMFIELD, N. J.,  
June 14, 1901.



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## SUGGESTIONS TO TEACHERS

1. The preface explains the general purpose of the book.
2. Read the book itself. The purposes of certain special features appear only when considered in relation to other features.
3. Do not hesitate to use in advance of the order in the book facts which appear later in these pages.
4. While the purpose of number-study is to learn numbers, oral expression needs to be encouraged. Develop the number-story features of primary work as much as time permits. The reading and the speaking of English sentences where numbers are involved do not interfere with, but rather tend to promote, that rational understanding of number-processes which is the end of Arithmetic as a science.
5. See that the children do study this book, but do not ask them to study quietly over twenty minutes at any one time. Children tire quickly and recover even more quickly.
6. Drill for the sake of instant accuracy; but do not follow any drill to the point of over-fatigue. Take great care not to drill upon things not essential.
7. This book is only a collection of suggestions; it is not an encyclopedia of devices. Seek great variety in methods and devices. There are children who will not learn things in our ways. Try to find their ways of understanding number-facts and number-principles.
8. Every child has peculiar interests. Find them. For number-stories use facts which interest the various children. Remember that children have their "good" and their "bad" days. On their good days children sometimes learn an amazing amount of new matter.
9. A boy or girl may be ready to undertake harder work than this book offers before knowing this book from cover to cover. Yet we should not forget that doing easy things over and over begets confidence, which supports us in our attacks upon new and harder problems.
10. Neatness in writing tends to accuracy in all number-operations. Encourage fine work by commending it.

## INTRODUCTORY REVIEW

1. Add and subtract these numbers :

$$\begin{array}{r} 13 \\ \underline{2} \end{array} \quad \begin{array}{r} 14 \\ \underline{2} \end{array} \quad \begin{array}{r} 15 \\ \underline{2} \end{array} \quad \begin{array}{r} 16 \\ \underline{2} \end{array} \quad \begin{array}{r} 10 \\ \underline{8} \end{array} \quad \begin{array}{r} 12 \\ \underline{8} \end{array} \quad \begin{array}{r} 17 \\ \underline{2} \end{array} \quad \begin{array}{r} 8 \\ \underline{2} \end{array} \quad \begin{array}{r} 18 \\ \underline{2} \end{array} \quad \begin{array}{r} 11 \\ \underline{6} \end{array}$$

$$\begin{array}{r} 15 \\ \underline{3} \end{array} \quad \begin{array}{r} 13 \\ \underline{4} \end{array} \quad \begin{array}{r} 16 \\ \underline{3} \end{array} \quad \begin{array}{r} 11 \\ \underline{7} \end{array} \quad \begin{array}{r} 14 \\ \underline{3} \end{array} \quad \begin{array}{r} 17 \\ \underline{3} \end{array} \quad \begin{array}{r} 14 \\ \underline{6} \end{array} \quad \begin{array}{r} 10 \\ \underline{5} \end{array} \quad \begin{array}{r} 11 \\ \underline{4} \end{array} \quad \begin{array}{r} 12 \\ \underline{6} \end{array}$$

$$\begin{array}{r} 10 \\ \underline{6} \end{array} \quad \begin{array}{r} 11 \\ \underline{5} \end{array} \quad \begin{array}{r} 12 \\ \underline{7} \end{array} \quad \begin{array}{r} 10 \\ \underline{7} \end{array} \quad \begin{array}{r} 13 \\ \underline{7} \end{array} \quad \begin{array}{r} 13 \\ \underline{5} \end{array} \quad \begin{array}{r} 13 \\ \underline{6} \end{array} \quad \begin{array}{r} 14 \\ \underline{8} \end{array} \quad \begin{array}{r} 15 \\ \underline{4} \end{array} \quad \begin{array}{r} 15 \\ \underline{6} \end{array}$$

$$\begin{array}{r} 14 \\ \underline{5} \end{array} \quad \begin{array}{r} 12 \\ \underline{3} \end{array} \quad \begin{array}{r} 10 \\ \underline{4} \end{array} \quad \begin{array}{r} 16 \\ \underline{7} \end{array} \quad \begin{array}{r} 10 \\ \underline{3} \end{array} \quad \begin{array}{r} 11 \\ \underline{3} \end{array} \quad \begin{array}{r} 12 \\ \underline{4} \end{array} \quad \begin{array}{r} 11 \\ \underline{8} \end{array} \quad \begin{array}{r} 12 \\ \underline{5} \end{array} \quad \begin{array}{r} 14 \\ \underline{7} \end{array}$$

2. Read and answer :

$$27 - 5 - 2 - 2 - 2 = ?$$

$$19 + 1 + 7 - 6 - 1 = ?$$

$$25 - 4 - 1 - 10 = ?$$

$$23 - 10 - 3 - 5 + 1 = ?$$

$$20 - 9 - 1 + 2 = ?$$

$$18 - 8 + 10 - 8 + 6 = ?$$

3. Measure the length and width of this page.

4. Measure the length and width of your desk top.

5. How high is the front edge of your desk from the floor ?

6. Cut a string twelve inches long. Cut off a piece four inches long. Compare the parts.

7. Cut a strip of paper 6 inches long. Cut another strip 3 inches long. Mark off both into inches.