

**CHILDREN ARITHMETICS BY  
GRADES, GLOBE SERIES.  
THIRD BOOK, FOURTH YEAR,  
INTERMEDIATE PRINCIPLES**

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Children Arithmetics by Grades, Globe Series. Third Book, Fourth Year, Intermediate Principles  
by William E. Chancellor

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**WILLIAM E. CHANCELLOR**

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Room 16, Liberty School. Geo. Windom.

1. Multiply 34601 by 385 and prove the answer.

$$\begin{array}{r} 34601 \\ \times 385 \\ \hline 173005 \\ 276808 \\ 103803 \\ \hline 13321385 \end{array}$$
$$\begin{array}{r} 385 \overline{)13321385} \\ \underline{1155} \phantom{00} \\ 1771 \phantom{00} \\ \underline{1540} \phantom{00} \\ 2313 \phantom{00} \\ \underline{2310} \phantom{00} \\ 385 \phantom{00} \\ \underline{385} \phantom{00} \\ \phantom{00000000} \end{array}$$

Answer  
13321385

2 What is the ratio of two years to four months?

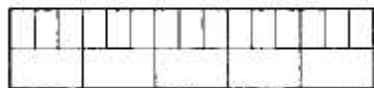
$$1 \text{ yr.} = 12 \text{ mo.}$$

$$2 \text{ yr.} = 12 \text{ mo.} \times 2 = 24 \text{ mo.}$$

$$4 \text{ mo.} : 24 \text{ mo.} = 1 : x \quad 4x = 24 \quad x = 6$$

Answer: The ratio is six.

3 Show by a drawing that  $\frac{1}{5} = \frac{3}{15}$



$$\begin{array}{l} 15 \text{ths} \\ 5 \text{ths} \end{array} \quad \frac{3}{15} = \frac{1}{5}$$

*CHILDREN'S ARITHMETICS BY GRADES*

*GLOBE SERIES*

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# THIRD BOOK

FOURTH YEAR

## INTERMEDIATE PRINCIPLES

BY

WILLIAM E. CHANCELLOR, A.M.

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M. P. 1

"The merely oral method does not suffice for the production of the independent scholar. The text-book method holds the pupil responsible for mastering critically the printed page. It requires him to make alive again its thoughts and perceptions. This training in the critical study of the printed page fits him for the work of independent investigation."

W. T. HARRIS, LL.D.

*United States Commissioner of Education.*

*Address on Horace Mann, N. E. A., Buffalo, 1896.*

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NEW YORK

## PREFACE

THIS book is for boys and girls who can use numbers into the thousands in addition and subtraction, who know what ratio is and understand something about fractions, who know some facts of measures, and who have studied the multiplication tables. For these boys and girls there is here about a year's work, chiefly in practice, partly in extension of knowledge.

The new topics introduced here are direct outgrowths of earlier topics, and are presented in their simplest forms and relations. Ratio develops into proportion, and proportion into equation. The common fraction is correlated with percentage, with the decimal, and with ratio and proportion. Factoring is centered upon dividing, and cancellation is centered upon both. The method of long division is explained. A few pages are devoted to each of two topics, greatest common divisor and least common multiple. But the emphasis of the book is upon the fundamental operations of addition and subtraction, multiplication and division for drill, and upon fractions and measures for development of arithmetical knowledge and skill.

This book is more nearly topical in arrangement than either of the two earlier books of this Series; but an essentially spiral character is secured by frequent reviews. Subjects are not exhausted before we pass to new subjects or return to old subjects displayed in new matter.

It is sound child-psychology to believe that boys and girls in fourth, fifth, and sixth grades have singular power and even pleasure in undergoing the exercises of drill in any and every subject. It is fortunate that there is such a period in the



mental and physical life as that passed by children usually in their fourth, fifth, and sixth grades at school. It is unfortunate that sufficient advantage of this age in life has not yet been taken by the text-book writers. In particular, in arithmetic we have many excellent books and monographs discussing methods, devices, and exercises in teaching the elementary facts of number from one to twenty, and very many books discussing and exemplifying arithmetic as a science. Most of these latter books are logical, but few are psychological. They are treatises upon arithmetic or manuals for adult teachers rather than text-books for young students. In a bibliography of many hundred titles one finds not ten books and essays which even try to present, or to demonstrate proper methods of presenting, to boys and girls nine to twelve years of age such fundamental and intermediate operations as are indicated in this book. Our pedagogical philosophers have clear and correct ideas of the minds of six year old children; and our text-book writers have at least scientifically arranged the topics of arithmetic for fifteen year old boys and girls. But I fail to find any considerable number of authors who have deliberately set before themselves the problems of the minds of the boys and girls who are likely to need such a book as this.

On the other hand, we find year by year our business men saying that the boys and girls who leave school at the ages of twelve to fourteen know nothing accurately in arithmetic, not even the fundamental operations. This is a curious fact in view of the other fact that the very power of the ten to twelve year old child is to undergo drill. This book is an effort to present interesting forms of such drill as will develop quickness and accuracy.

It is not meant that we are to question the principle that "the problem is the unit of arithmetic." It is meant that success in the problem is conditioned by mere mechanical facility and correctness in number-manipulation. There ought to be many problems in considerable variety in every arith-

metic text-book. Every characteristic problem ought to be thoroughly studied and completely understood, and this as early in the child's life as possible.

I sympathize strongly, as this series shows, with the ratio-apostles who teach ratio "early and often." I see in ratio the true key to the fraction which is otherwise the child's arithmetical "bugaboo." But I am far from believing that we can profitably thrust many of the complications of percentage and interest, of denominate numbers, even of fractions, into grades lower than those in which they are nowadays usually found in our American common schools. Hence in this third book of the series designed for children's manuals I have seized as a true educational opportunity the time of teachers and students for many exercises in the simple, ever useful principles of addition, subtraction, multiplication, and division, and in the elements of common fractions, ratio, proportion, percentage, and decimals. It has often been said that "science is exact measurement." These principles are the instrumentalities of exact measurement, whether in the bookkeeping of a commercial business, or in the speculations of mathematical astronomy, or in the researches of quantitative chemistry.

In work in such a grade as this book is designed to serve it is unquestionable that the boys and girls need a text-book to study. It is very easy for teachers to over-develop the arithmetical instruction of boys and girls, one of whose greatest joys is, if they have been rightly taught, in finding out things for themselves and in setting their own tasks. We are here at a stage in advance of that in which it is constantly necessary to renew in the pupil's mind the sense of the facts that figures are merely the symbols of numbers and that numbers always relate to real things. We can now deal with figures, manipulating them usually without consciousness of what they represent, in exactly the spirit of the bank employee who forgets that the coins and bank notes he handles are money with purchasing power, and treats his cash, as he ought, in isolation from its concrete values.

It may be argued that this is the disciplinary or cultural view of arithmetic rather than the utilitarian. If so, I hold it because of my understanding of the actual powers and interests of children. The supremacy of the human creature is due to his long infancy, to his long preparation before the responsibilities of self-dependence roll in upon him. In the light of this fact, it is both necessary and desirable to postpone, to the years when the child can understand them, those utilities of education which involve the minute details of practical life. The greatest of all the world's utilities is an affirmative, honest, accurate human mind. Arithmetic, even though chiefly disciplinary, is perfectly justified in its forms and methods if it tends to produce an active, clear, and careful mind.

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W. E. C.

BLOOMFIELD, N. J.,  
August 3, 1901.