

**KEY TO THE NORTH
AMERICAN ARITHMETIC: PART
SECOND AND PART THIRD,
FOR THE USE OF TEACHERS**

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Key to the North American Arithmetic: Part Second and Part Third, for the Use of Teachers by
Frederick Emerson

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FREDERICK EMERSON

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**THE
NORTH AMERICAN ARITHMETIC.**

THE above is the common title of three books, by Frederick Emerson, late Principal in the Department of Arithmetic, Boylston School, Boston. These books are severally denominated

**EMERSON'S FIRST PART,
EMERSON'S SECOND PART,
EMERSON'S THIRD PART.**

PART FIRST is a small book, designed for children from five to eight years of age. The plan of this little book is entirely original, and very peculiar. The lessons are illustrated with cuts and unit marks, and are rendered at once interesting and impressive.

PART SECOND contains within itself, a complete system of Mental and Written Arithmetic, sufficiently extensive for all the common purposes of business, and is designed as a standard book for common schools. This work is so gradual in its progress, that each lesson prepares the learner for that which follows, and comparatively little instruction is required from the teacher.

PART THIRD is designed for advanced scholars. It comprises a synthetic view of the science of numbers, a copious development of the higher operations, and an extensive range of commercial information. Scholars who are to be educated for the business of the counting-room, or for the duties of any public office, as well as those who are to prosecute a full course of mathematical studies, will find this book suited to their purpose.

The Publishers of Emerson's System of Arithmetic invite attention to the following remarks, which are extracted from some of the numerous recommendations of the work.

THE INSTRUCTORS OF THE BOSTON PUBLIC SCHOOLS say—"We have considered it our duty to render ourselves acquainted with the more prominent systems of Arithmetic, published for the use of schools, and to fix on some work which appears to unite the greatest advantages, and report the same to the School Committee of Boston, for adoption in the Public Schools. After the most careful examination, we have, without any hesitancy, come to the conclusion, that Emerson's North American Arithmetic, (First, Second, and Third Parts,) is the work best suited to the wants of all classes of scholars, and most convenient for the purposes of instruction. Accordingly, we have petitioned for the adoption of this work in the Public Schools."

THE BOSTON SCHOOL BOARD, after receiving the petition above alluded to, passed an *Order*—"That Emerson's North American Arithmetic be substituted for Colburn's First Lessons and Sequel."

THE INSTRUCTORS OF THE NEW YORK CITY SCHOOLS say—"The work is evidently an improvement in the branch of learning

which it treats; and we fully concur with the Masters of the Public Schools of Boston in the views which they have expressed respecting its character."

MR. S. W. SETON, Visitor for the Public School Society of New York City, in his remarks upon the First and Second Part, says — "It is as perfect a school book as I have ever examined. None in this branch of instruction has so well and truly illustrated the subject."

PROFESSOR HOPKINS, of Williams College, in a note to the Author of the work, says — "It unites simplicity with fulness, and will thus be sure to interest beginners, whilst it furnishes, at the same time, an ample guide for the more advanced pupil."

PROFESSOR JOSLIN, of Union College, concludes his remarks on the work by saying, — "Here the student will acquire not merely rules to guide his hand, but principles to enlighten his understanding. He is not furnished with a mere mill for grinding numbers into a certain result under cover."

PROFESSOR WALL, of Ohio University, among other remarks respecting the work, says — "The method of illustrating the fundamental principles of fractions is clear and forcible, and perfectly happy in its adaptation to the minds of youth."

PROFESSOR HAMILTON, of Nashville University, after examining the First and Second Parts, writes — "I think the work, thus far, better adapted to awaken interest and excite inquiry in the youthful mind, than any elementary treatise which I have seen. The arrangement is natural, and the questions simple and practical, and the rules clearly and fully expressed."

PROFESSOR PEIRCE, of Harvard (Cambridge) University, writes — "I have examined the Third Part of Mr. Emerson's Arithmetic with great pleasure. The perspicuity of its arrangement, and the clearness and brevity of its explanations, combined with its happy adaptation to the purposes of practical business, are its great recommendations. I hope it will be soon introduced into all our schools, and take the place of ill-digested treatises, to which our instructors have hitherto been compelled to resort."

DR. GRISCOM writes — "The North American Arithmetic, by Frederick Emerson, appears to me to exhibit the science of numbers in a manner more clear, simple, and practical, better adapted to the use of schools, and the benefit of teachers, who may not themselves be thoroughly conversant with arithmetic, than any book I have seen."

PROFESSOR M'GOWAN, of St. Louis University, being requested by PRESIDENT VERHAGEN to examine the work and state his opinion respecting it, writes — "I have carefully examined Mr. Emerson's North American Arithmetic, and consider it the best treatise upon the subject with which I am acquainted."

THE LIVERPOOL (BRITISH) JOURNAL, in a review of Emerson's System of Arithmetic, says — "It is the very best American book which we have seen, on the science of arithmetic and the practice of commercial calculations."

° KEY
TO THE
NORTH AMERICAN ARITHMETIC,
PART SECOND
AND
PART THIRD.
FOR THE USE OF TEACHERS

BY **FREDERICK EMERSON,**
AUTHOR OF THE NORTH AMERICAN ARITHMETIC.



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Entered according to Act of Congress, in the year 1838, by FREDERICK EMERSON,
in the Clerk's Office of the District Court of the District of Massachusetts.

P R E F A C E .

This book contains solutions of some of the questions in the Oral exercises, and answers to *all* the examples in the Written exercises, of the North American Arithmetic, Part Second: — It also contains answers to all the examples, and solutions to the more difficult questions in the exercises of Part Third.

To those who have been accustomed to teaching arithmetic analytically, that portion of the Key which relates to the Oral exercises, will be useless. Nor need it be used by *any* teacher who will *not* begin Part Second with a class, and proceed step by step through every section. But it may often happen, that a teacher unacquainted with the method of instructing in mental arithmetic, will be called to the instruction of a school, in which the scholars have already made some progress therein. In such cases, the solutions will be found convenient.

That portion of the Key which relates to the Written Arithmetic, will be found convenient for *all* teachers; as it will save much time in the examination of answers. The advantage of keeping answers to examples out of the text-book is obvious — If the learner have an answer before him, his immediate object will naturally be, to arrive at that answer in his work, with little regard to the reasons why his work leads to it; but, if the answer be unknown, his effort will be to discover the course, which he shall perceive, *must of necessity* lead to the answer.

F. E.

¶ Soon after the publication of the First Part of the North American Arithmetic, several books appeared, which were evident violations of its copy-right. One of these books has been suppressed; and the others have not been thought worth noticing. Parts Second and Third are now published; and, as their proprietors would avoid litigation, they think proper to give notice, that, if any compiler shall avail himself of the peculiarities of these publications, redress will be sought under the late Act of Congress.

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TO THE

NORTH AMERICAN ARITHMETIC.

PART SECOND.

ORAL SOLUTIONS.

CHAPTER I.

SECTION 1.

Example 6. The figure 1, and one cipher.

7. The figure 1, and two ciphers

SECTION 2.

1. Six tens.

2. Sixty.

7. One-hundred and fifty.

12. One-hundred and seventy-five.

CHAP. II.

SECTION 1.

6. 9 cents and 7 cents are 16 cents.

SECTION 2.

2. 40 oranges and 20 oranges are 60 oranges.

9. 70 books and 50 books are 120 books.

SECTION 3.

2. 30 fishes and 40 fishes are 70 fishes; 70 fishes and 9 fishes are 79 fishes.

SECTION 5.

2. 7 years and 9 years are 16 years, which will be the son's age. 47 years and 9 years are 56 years, which will be the father's age.

SECTION 6.

1. 29 dollars and 4 dollars are 33; 33 dollars and 5 dollars are 38 dollars.

SECTION 7.

2. 23 cents and 30 cents are 53 cents; 53 cents and 9 cents are 62 cents.

16. 5 and 9 are 14, and 2 are 16, and 8 are 24, and 6 are 30, and 4 are 34.

CHAP. III.

SECTION 1.

3. She must have as many more, as the difference is, between 7 and 12. 7 from 12 leaves 5.

11. He gave the difference between 9 cents and 13 cents. 9 from 18 leaves 9.

SECTION 2.

1. As many of the crew were living, as the difference is, between 30 and 70. 30 from 70 leaves 40.

SECTION 4.

15. 57 and 5 are 62. 5 from 62 leaves 57.

21. 36 and 5 are 41. 5 and 36 are 41. Then 5 from 41 leaves 36. 36 from 41 leaves 5.

SECTION 5.

3. 23 questions and 7 questions are 30 questions. 30 questions and 23 questions are 53 questions.

5. 66 dollars and 30 dollars are 96 dollars. 96 dollars from 100 dollars leaves 4 dollars.

7. 48 dollars and 3 dollars are 51 dollars; 51 dollars and 8 dollars are 59 dollars.

12. Arthur's knife was worth 7 cents more than Walter's; therefore, A. should have *received* 7 cents. But, since A. *paid* 6 cents, he lost 7 cents and 6 cents, which is 13 cents.

22. 8 dollars and 15 dollars are 23 dollars; 23 dollars and 12 dollars are 35 dollars, which is what he paid out! Since he sold the whole for 39 dollars, he gained 4 dollars.

CHAP. IV.

SECTION 1.

2. It will take 5 times as much cloth to make 5 cloaks, as it will to make 1 cloak. 5 times 4 yards are 20 yards.

SECTION 2.

2. 10 and 3. 6 times 10 are 60. 6 times 3 are 18. 60 and 18 are 78. Then 6 times 13 are 78.

SECTION 4

3. In 1 ounce there are 20 penny-weights. In 4 ounces there are 4 times 20 penny-weights, or 80 penny-weights. 80 penny-weights and 13 penny-weights are 93 penny-weights.

CHAP. V.

SECTION 1.

2. I could buy as many pencils, as there are times 4 cents, in 16 cents. 4 in 16, 4 times.

8. As many times as 7 dollars are contained in 14 dollars, so many yards can be purchased. 7 in 14, 2 times.

16. There were as many rows, as there were times 5 trees. 5 in 30, 6 times.

24. 60 limes are worth as many oranges, as 6 is contained times in 60. 6 in 60, 10 times.

SECTION 2.

7. Each boy must pay as many cents, as 3 is contained times in 24. 3 in 24, 8 times.

20. There are as many sheets in each book, as 7 is contained times in 42. 7 in 42, 6 times.

SECTION 3.

2. 8 is contained in 34, 4 times, and there is 2 over; —therefore he can trim 4 vests, and he will have 2 buttons remaining.

13. 4 is contained in 29, 7 times, and there is 1 over. 7 times 4 is 28, and 1 is 29.

25. As many times as 4 is contained in 15, so many