

**NATURAL SERIES. THE ANALYSIS  
OF INTELLECTUAL ARITHMETIC  
WITH MANTAL AND BLACKBOARD  
EXERCISES. DESIGNED FOR  
PUBLIC AND PRIVATE SCHOOLS**

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Natural Series. The Analysis of Intellectual Arithmetic with Mantal and Blackboard Exercises.  
Designed for Public and Private Schools by S. A. Felter

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**S. A. FELTER**

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THE  
ANALYSIS  
OF  
INTELLECTUAL ARITHMETIC,

WITH  
Mental and Blackboard Exercises.

DESIGNED FOR  
PUBLIC AND PRIVATE SCHOOLS.

BY  
S. A. FELTER, A. M.,

LATE OF THE BROOKLYN COLLEGIATE AND POLYTECHNIC INSTITUTE, AUTHOR OF A SERIES  
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Entered, according to Act of Congress, in the year 1868, by

S. A. FELTER,

In the Clerk's Office of the United States, for the District Court of the Southern District of New York.

## PREFACE.

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THE principal object of this book is to assist the teacher in leading the pupil gradually and systematically from the analysis of the simple to that of the complex problem, a peculiarity of this series which has received universal commendation.

The distaste for the study of intellectual arithmetic, which is frequently found in schools, is chiefly due to the inability on the part of pupils to perform, readily, mental calculations. To make them prompt, quick, and practical, numerous blackboard exercises and brief methods of combining numbers in the fundamental rules, fractions, and interest, are introduced.

To more clearly unfold by mental exercises the principles of arithmetic, it is thought that the same formulas should be used both in mental and written, the same methods of analysis given, similar slate and blackboard exercises introduced, and the subjects presented in the same order, that the pupil may fully appreciate that mental and written arith-

metic are one and the same thing in fact and expression.

The exercises for general analysis are so arranged, that the simple precedes and illustrates the complex, and so comprehensive as to embrace every variety of language by which mathematical relations are expressed in problems. This is a new feature, which it is hoped, will give a stimulant to healthy mental activity.

The author has endeavored to give a practical exposition of the Metric system of weights and measures. By retaining the names of such only of the denominations as are necessary in the transaction of business, he has simplified the cumbersome nomenclature which forms so great an obstacle to its general introduction.

In view of the cordial reception which has been accorded to the former numbers of the *Natural Series* by his fellow teachers and the friends of education generally, the author cannot forbear to hope that this effort may meet with a like kind and sympathetic response; and he, at the same time, would tender his sincere thanks for the assistance rendered by valuable suggestions and timely criticisms.

NEW YORK, JAN., 1868.



# INTELLECTUAL ARITHMETIC.

## ADDITION.

### LESSON I.

#### BLACKBOARD EXERCISES.

##### *Model Operations.*



**NOTE.**—The above black-board exercises are to be recited as follows:—

Beginning at one, go round the circle five times, to the right and to the left alternately, naming the sum of the figure at the centre and each successive figure on the circumference.

90	80	70	60	50	40	30	20	10
80	70	90	50	60	10	20	40	60
—	—	—	—	—	—	—	—	—

**FORMULA.**—3 tens and 9 tens are 12 tens; 12 tens are equal to 120 units.

**1. Rule.\***—I. *Annex a cipher to the sum of the left hand column; thus: 12, 120; 15, 150; 18, 180; -11, 110; &c.*

#### SUGGESTIONS TO THE TEACHER.

**PREPARATION.**†—Each pupil should write on his slate *ten* exercises like the model, and repeat mentally the sum of each example, (See Rule,) at least five times, commencing at the left and the right alternately.

**RECITATION.**—*Exercise 1.* Let the Teacher write on the blackboard *ten* exercises like the model; and the pupil should recite them in the same manner. (See Rule.)

*Ex. 2.* Require the pupils, singly or together, to give the sum of each example as soon as it is pointed to by the Teacher; thus: 120, 150, 180, &c.

*Ex. 3.* Require the pupils, singly or in concert, to give the sum instantly without the use of either slate or of blackboard.

**N. B.**—Pupils should be required to commit THOROUGHLY the above and each of the following blackboard exercises before proceeding.

#### PROBLEMS.

*Containing but one Elementary Question.*

Mary has 30 books, and Margaret has 40; how many have both?

**ARITHMETICAL FORMULA.**—*If Mary has 30 books and Margaret has 40, both have the sum of these numbers, which is 70 books; hence both have 70 books.*

\* **NOTE.**—The following rules for recitation are but brief directions, intended to aid in quick and accurate addition. The formulas need not be used after they are understood.

† **NOTE.**—The following notes in regard to recitation and study are intended to be *suggestive* only. The teacher should vary both according to *circumstances*.

1. If Susan has fifty apples and Jane 90 ; how many have both ?
2. Eliza is 30 years old and Laura is 60 ; what is the sum of their ages ?
3. George placed 40 nuts in one pile and 90 in another ; how many nuts in both piles ?
4. A man bought a cow for \$30, and a horse for \$90 ; what was the cost of both ?
5. A lady paid 80 cents for silk, and 40 cents for ribbon ; how much did she pay for both ?
6. Charles paid 30 cents for a slate and 80 cents for a book ; how much did he pay for both ?
7. Hannah counted 30 apples in one basket, and 50 in another ; how many apples in both ?
8. John is 40 years old, and Susan is 20 years older ; how old is Susan ?
9. Little Peter is 10 years old, and his father is 30 years older ; how old is his father ?
10. Robert is 30 years older than John, and John is 20 ; how old is Robert ?

**SUGGESTIONS.**—In addition to the above, each pupil may hand to the teacher in writing, one or more problems like the above, to be read to the class for solution. This will do much to break the routine into which classes in mental arithmetic are very apt to fall.

#### EXERCISES IN ADDITION.

What are the sums of the following series of numbers ?

- 1.—3, 2, 4, 1, 4, 2, 4, 3, 2, 4, 3, 2, 0, 1, 2, 3, 4, 2, &c.
- 2.—3, 1, 3, 2, 4, 1, 3, 2, 4, 1, 2, 3, 3, 1, 4, 2, 1, 1, &c.
- 3.—4, 1, 2, 3, 2, 4, 3, 2, 1, 3, 4, 2, 2, 1, 3, 3, 4, 2, &c.
- 4.—4, 2, 5, 3, 3, 2, 1, 1, 4, 2, 3, 0, 5, 3, 4, 4, 1, 2, &c.
- 5.—5, 2, 3, 4, 2, 3, 4, 1, 5, 4, 4, 2, 0, 3, 2, 1, 4, 3, &c.