

**A THEORETICAL AND PRACTICAL
ARITHMETIC; DESIGNED FOR
COMMON SCHOOLS AND
ACADEMIES, PP. 1-273**

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A Theoretical and Practical Arithmetic; Designed for Common Schools and Academies, pp. 1-273 by Daniel Leach & William D. Swan

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DANIEL LEACH & WILLIAM D. SWAN

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BY

DANIEL LEACH AND WILLIAM D. SWAN.

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P R E F A C E .

It has been the aim of the authors, in preparing this work, to make it eminently both a practical and a theoretical treatise on the science of numbers. They have therefore adopted that arrangement which has appeared the most philosophical, and, at the same time, the best suited to the comprehension of the learner.

They have bestowed great labor on the rules and definitions, in order to make them *lucid, concise, and accurate*; and they have carefully avoided introducing any illustrations or remarks not necessary to a clear understanding of the subject.

The examples have been prepared with much discrimination. Many of them are questions which have actually occurred in ordinary business transactions.

They would call attention first to the examples in addition, some of which have been so arranged as to bring together the same combination of figures

throughout the same line. The long leger columns are designed for those who wish to acquire a facility in adding long columns. This is one of the most useful exercises in arithmetic to which pupils can be accustomed.

They would also call particular attention to the rule for finding the least common multiple, the rule of alligation, and the rule for extracting the cube root. These rules are clear and concise, and can be most rigidly demonstrated; while in the processes indicated by them there is a saving of more than one half of the figures, as compared with the processes in similar works now in common use. The section on fractions, they think, will also commend itself to every experienced teacher.

Although the preface is not the proper place for discussing the best method of teaching arithmetic, yet the authors cannot refrain from urging upon all teachers not to allow their pupils to attempt to solve a question till they fully understand all its conditions, and *always* to require them to state the principles upon which each solution is founded. Pupils should be accustomed to write questions of their own under each rule. This is a very important exercise.

They would also suggest that, in *every* question in which there are both multiplication and division, the pupil should at first indicate the processes by their

appropriate signs, and then cancel the factors common to the dividend and divisor.

In the preparation of this work, a large number of the recent English and American treatises on arithmetic have been consulted, and the most valuable mathematical works of the French.

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THEORETICAL AND PRACTICAL

ARITHMETIC.

INTRODUCTION.

SECTION I.

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1. ARITHMETIC is the science of numbers.
2. *Numbers* express how many units, or parts of a unit, there are in any quantity.
3. *Quantity* is any thing that can be increased, diminished, or measured.
4. The least whole number employed to express or measure quantity of the same kind is called a *unit*.
5. A number expressing a particular kind of a unit is called a *concrete* number; as, 1 dollar, 2 books, &c.
6. When a number does not express any particular kind of a unit, it is called an *abstract* number; as, 1, 4, 7, &c.

Obs. 1. Concrete numbers are also called *denominate* or *compound* numbers.

Obs. 2. Whole numbers are sometimes called *integers*.

7. In the computation of numbers, ten characters are employed, called *figures*; thus: 1, one; 2, two; 3,

What is arithmetic? What are numbers? What is quantity? What is a unit? What is a concrete number? What is an abstract number?

three; 4, four; 5, five; 6, six; 7, seven; 8, eight; 9, nine; 0, cipher. The first nine figures are called *significant*, because they have a given value assigned them. The cipher has no representative value, but is used where no number is to be expressed.

Obs. 1. By the aid of these ten characters any possible or conceivable quantity may be expressed.

Obs. 2. The first nine figures are sometimes called *digits*, from the Latin word *digitus*, signifying a *finger*.

8. The various operations of arithmetic are performed by NUMERATION, ADDITION, MULTIPLICATION, SUBTRACTION, and DIVISION.

Addition and multiplication are employed to show how numbers may be *increased*; subtraction and division how they may be *diminished*.

NUMERATION.

SECTION II.

9. NUMERATION is the art of expressing any number whatever by figures.

Figures are arranged in different orders or places, and have different values assigned them, according to the place they occupy. The first place, which is always at the right, represents units; the second, tens; the third, hundreds; the fourth, thousands; the fifth, tens of thousands; the sixth, hundreds of thousands; the seventh, millions, &c. Thus the figure 1 represents a unit, a ten, a hundred, a thousand, &c., according to the place it occupies. In all places in which no number is to be expressed, ciphers must be written.

Which are significant figures? How are the various operations of arithmetic performed? What is numeration? How are figures arranged? What does the first place represent? The second? The third? The fourth? The fifth? &c. When must ciphers be used?