

**THE NATURAL
ARITHMETIC.
SPECIALLY PREPARED FOR
ELEMENTARY SCHOOLS**

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The Natural Arithmetic. Specially Prepared for Elementary Schools by Z. Richards

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BY

Z. RICHARDS, A.M.



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PREFACE.

To the Friends of Elementary Schools:—

The Natural Arithmetic has been prepared to meet a demand which has grown out of the experience of live, progressive teachers during the last ten years. Many educators have learned that a large part of the matter in common arithmetics is of no practical use to nine tenths of the children in our elementary schools; and that the fundamental principles involved in the use of numbers are *few*; but that they are enshrouded in many blind and useless rules. At least one half of the time usually spent in studying arithmetic is wasted in memorizing rules and processes, and in unraveling mysteries which yield no profit even when solved.

The study of arithmetic is required, not only for its practical value, but also because of its supposed disciplinary advantages. But while it is not evident that arithmetic has superior advantages in the way of discipline, it is evident that more than one half of the labor usually required to flounder through the uncomprehended matter of the common text-books is destitute of any valuable discipline or practical advantage. In this work, the design has been to eliminate everything not necessary to secure sound discipline and practical training. It is not claimed that this work is perfect or exhaustive; but that it is a step in the right direction and is sufficiently exhaustive to furnish all the arithmetical training and practical knowledge of numbers needed during the first five or six years of school training. It will furnish all the practical and theoretical knowledge of

PREFACE.

arithmetic needed to fit the pupil for any of the common employments of life and for more advanced arithmetical and mathematical training.

While this work furnishes all that any pupil needs to know of arithmetic, during the first six years of school, it also furnishes hints to the teachers as to the best methods of teaching it. Nearly all the first part of this book is to be studied by the teacher, and the principles taught orally by the use of the blackboard and slate. Many of the rules and suggestions are *new* and well proved.

Z. RICHARDS.

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MULTIPLICATION AND DIVISION TABLES.

As it is essential that these Tables should be memorized at as early a period as possible, the following method of learning them is recommended :—

$$2 \times 1 = 1 \times 2 = 2 \text{ and } 2 + 1 = 2 \text{ and } 1 + 2 = \frac{1}{2}$$

$$2 \times 2 = 4 \quad \text{and } 4 + 2 = 2$$

$$2 \times 3 = 3 \times 2 = 6 \text{ and } 6 + 2 = 3 \text{ and } 6 + 3 = ?$$

or, one half of $6 = 3$ and one third of $6 = 2$, etc.

$$2 \times 4 = 4 \times 2 = 8 \text{ and } 8 + 2 = 4 \text{ and } 8 + 4 = 2$$

$$2 \times 5 = 5 \times 2 = 10 \text{ and } 10 + 2 = 5 \text{ and } 10 + 5 = 2$$

$$2 \times 6 = 6 \times 2 = 12 \text{ and } 12 + 2 = 6 \text{ and } 12 + 6 = 2$$

$$2 \times 7 = 7 \times 2 = 14 \text{ and } 14 + 2 = 7 \text{ and } 14 + 7 = 2$$

$$2 \times 8 = 8 \times 2 = 16 \text{ and } 16 + 2 = 8 \text{ and } 16 + 8 = 2$$

$$2 \times 9 = 9 \times 2 = 18 \text{ and } 18 + 2 = 9 \text{ and } 18 + 9 = 2$$

$$2 \times 10 = 10 \times 2 = 20 \text{ and } 20 + 2 = 10 \text{ and } 20 + 10 = 2$$

$$3 \times 3 = 9 \quad \text{and } 9 + 3 = 3 \text{ and } 1 + 3 = \frac{1}{3}$$

$$3 \times 4 = 4 \times 3 = 12 \text{ and } 12 + 3 = 4 \text{ and } 12 + 4 = 3$$

$$3 \times 5 = 5 \times 3 = 15 \text{ and } 15 + 3 = 5 \text{ and } 15 + 5 = 3$$

$$3 \times 6 = 6 \times 3 = 18 \text{ and } 18 + 3 = 6 \text{ and } 18 + 6 = 3$$

$$3 \times 7 = 7 \times 3 = 21 \text{ and } 21 + 3 = 7 \text{ and } 21 + 7 = 3$$

$$3 \times 8 = 8 \times 3 = 24 \text{ and } 24 + 3 = 8 \text{ and } 24 + 8 = 3$$

$$3 \times 9 = 9 \times 3 = 27 \text{ and } 27 + 3 = 9 \text{ and } 27 + 9 = 3$$

$$3 \times 10 = 10 \times 3 = 30 \text{ and } 30 + 3 = 10 \text{ and } 30 + 10 = 3$$

$$4 \times 4 = 16 \quad \text{and } 16 + 4 = 4 \text{ and } 1 + 4 = \frac{1}{4}$$

$$4 \times 5 = 5 \times 4 = 20 \text{ and } 20 + 4 = 5 \text{ and } 20 + 5 = 4$$

$$4 \times 6 = 6 \times 4 = 24 \text{ and } 24 + 4 = 6 \text{ and } 24 + 6 = 4$$

$$4 \times 7 = 7 \times 4 = 28 \text{ and } 28 + 4 = 7 \text{ and } 28 + 7 = 4$$

$$4 \times 8 = 8 \times 4 = 32 \text{ and } 32 + 4 = 8 \text{ and } 32 + 8 = 4$$

$$4 \times 9 = 9 \times 4 = 36 \text{ and } 36 + 4 = 9 \text{ and } 36 + 9 = 4$$

$$4 \times 10 = 10 \times 4 = 40 \text{ and } 40 + 4 = 10 \text{ and } 40 + 10 = 4$$

$5 \times 5 = 25$ and $25 \div 5 = 5$ and $1 \div 5 = \frac{1}{5}$
 $5 \times 6 = 6 \times 5 = 30$ and $30 \div 5 = 6$ and $30 \div 6 = 5$
 or, one fifth of $30 = 6$ and one sixth of $30 = 5$, etc.
 $5 \times 7 = 7 \times 5 = 35$ and $35 \div 5 = 7$ and $35 \div 7 = 5$
 $5 \times 8 = 8 \times 5 = 40$ and $40 \div 5 = 8$ and $40 \div 8 = 5$
 $5 \times 9 = 9 \times 5 = 45$ and $45 \div 5 = 9$ and $45 \div 9 = 5$
 $5 \times 10 = 10 \times 5 = 50$ and $50 \div 5 = 10$ and $50 \div 10 = 5$

$6 \times 6 = 36$ and $36 \div 6 = 6$ and $1 \div 6 = \frac{1}{6}$
 $6 \times 7 = 7 \times 6 = 42$ and $42 \div 6 = 7$ and $42 \div 7 = 6$
 or, one sixth of $42 = 7$ and one seventh of $42 = 6$, etc.
 $6 \times 8 = 8 \times 6 = 48$ and $48 \div 6 = 8$ and $48 \div 8 = 6$
 $6 \times 9 = 9 \times 6 = 54$ and $54 \div 6 = 9$ and $54 \div 9 = 6$
 $6 \times 10 = 10 \times 6 = 60$ and $60 \div 6 = 10$ and $60 \div 10 = 6$

$7 \times 7 = 49$ and $49 \div 7 = 7$ and $1 \div 7 = \frac{1}{7}$
 $7 \times 8 = 8 \times 7 = 56$ and $56 \div 7 = 8$ and $56 \div 8 = 7$
 $7 \times 9 = 9 \times 7 = 63$ and $63 \div 7 = 9$ and $63 \div 9 = 7$
 $7 \times 10 = 10 \times 7 = 70$ and $70 \div 7 = 10$ and $70 \div 10 = 7$

$8 \times 8 = 64$ and $64 \div 8 = 8$ and $1 \div 8 = \frac{1}{8}$
 $8 \times 9 = 9 \times 8 = 72$ and $72 \div 8 = 9$ and $72 \div 9 = 8$
 $8 \times 10 = 10 \times 8 = 80$ and $80 \div 8 = 10$ and $80 \div 10 = 8$

$9 \times 9 = 81$ and $81 \div 9 = 9$ and $1 \div 9 = \frac{1}{9}$
 $9 \times 10 = 10 \times 9 = 90$ and $90 \div 9 = 10$ and $90 \div 10 = 9$

$10 \times 10 = 100$ and $100 \div 10 = 10$ and $1 \div 10 = \frac{1}{10}$

DIRECTIONS.—*First*, require the pupils to *read* the above tables in concert, and separately, until they can do it readily.

Second, require them to memorize the tables, so that they can recite them without mistake.