

**ECLECTIC EDUCATIONAL
SERIES. KEY TO RAY'S
NEW HIGHER ARITHMETIC**

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Eclectic Educational Series. Key to Ray's New Higher Arithmetic by Joseph Ray

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JOSEPH RAY

**ECLECTIC EDUCATIONAL
SERIES. KEY TO RAY'S
NEW HIGHER ARITHMETIC**

ECLECTIC EDUCATIONAL SERIES.

° KEY

TO

Joseph

RAY'S NEW HIGHER

A R I T H M E T I C



NEW YORK ❖ CINCINNATI ❖ CHICAGO
AMERICAN BOOK COMPANY

Edno 7 118,91,726

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Mar 27, 1928

SPECIAL NOTICE.

Ray's Arithmetics have recently been thoroughly revised, and issued as—

Ray's New Arithmetics.

Ray's New Primary Arithmetic, . . .	\$0 15
Ray's New Intellectual Arithmetic, . .	25
Ray's New Practical Arithmetic, . . .	50

Ray's Two-Book Series.

Ray's New Elementary Arithmetic, . .	35
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For High Schools and Colleges.

Ray's New Higher Arithmetic,	85
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The many changes in business transactions, as well as the advance in methods of instruction, have made such revision necessary. The New Arithmetics are sold for the *same low prices* as the old editions, notwithstanding the paper, printing, binding, and general appearance are far superior. Special terms, for the exchange of the new series for the old, can be had by application to the publishers.

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1881,
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NEW HIGHER AR.

E-F

PREFACE.

In the preparation of the following pages, the chief aim has been to serve the teacher. Accordingly, through a great part of the work we have merely indicated the operations required, and have thus saved the space which would be demanded for the full statements of analysis, useful chiefly in recitation drill.

The help afforded by a Key being of very little value under the fundamental rules, this work does not begin with the first exercises of the **NEW HIGHER ARITHMETIC**.

In most cases, after a short study of an arithmetical problem, the operations themselves, as indicated properly by signs, will suggest the reasoning on which the solution is based. In the solutions here given this has been kept in view, especially where the text-book has presented a *formula*. To the teacher and to the class, alike, it will be advantageous to have the blackboard work written in accordance with this plan; and, on this account, early in the Arithmetic, the subject of Arithmetical Signs has been formally presented.

To read the arithmetical syntax understandingly, and to write it with facility in recording solutions, are requirements worth far more than they cost. What is
(III)

here remarked has special reference to the *written work*. Oral explanation, reaching even to particulars, is not to be set aside; on the contrary, the judicious teacher will still require the minute details of an analysis, especially in the examples designated for such exercise in the Arithmetic.

There are a few instances in which the brevity mentioned above has not been observed. The experienced teacher knows, that, in some cases, the operations may be even very few in number and very simple in kind, while the reasons for them are not correspondingly obvious; in such instances, as also where the chief difficulty of the problem is in the complexity of the operation, we have aimed to give an extended solution. Among the articles under which this has been thought advisable, we may mention Compound Subtraction, Proportion, Commission, Stock Investments, Alligation, the applications of Evolution, and the added *Miscellany*.

CINCINNATI, *January*, 1881.

KEY TO RAY'S NEW HIGHER ARITHMETIC.

MULTIPLICATION.—BILLS AND ACCOUNTS.

Art. 65.

(2.)

St. Louis, March 1, 1879.

CHESTER SNYDER,

Bought of THOMAS GLENN.

1879.

			\$		
March	1	4 lb. tea, @ 40 ct. a lb.,	1	60	
"	1	21 " butter, @ 21 ct. a lb.,	4	41	
"	1	58 " bacon, " 13 ct. "	7	54	
"	1	16 " lard, " 9 ct. "	1	44	
"	1	30 " cheese, " 12 ct. "	3	60	
"	1	4 " raisins, " 20 ct. "	1	80	
"	1	9 doz. eggs, " 15 ct. a doz.,	1	35	
					\$20 74

Received payment,

THOMAS GLENN.

(5)

KEY TO RAY'S NEW

Art. 66.

(3.)

ALLEGHENY, April 1, 1880.

JAMES WILSON & CO.,

In Acc't with ALLEGHENY COAL CO.

1880.

		Dr.			\$	
March	2	To 500 tons coal, @ \$2.75 a ton,			1375	00
		Cr.				
"	3	By 14 bbl. flour, @ \$6.55 a bbl.,		\$	91	70
"	10	" 6123 lb. sugar, @ 8 ct. a lb.,			489	84
"	15	" cash on acc't,			687	50
					1269	04
		Balance due Allegheny Coal Co.,	- - - -		\$105	96

CONTRACTIONS IN MULTIPLICATION.

Art. 70.

CASE IV.

(1.)

7023
99
 702300
7023
 695277

(2.)

16642
996
 16642000
66568
 16575432

(3.)

372051000
744102
 372795102

Art. 71.

CASE V.

(1.)

38057
48618
 228342
685026
 1826736
1850255226

(2.)

267388
14982
 534776
3743432
 26204024
4006007016

(3.)

481063
63721
 3367441
10102323
 30306969
30653815423

(4.) $\begin{array}{r} 66917 \\ 849612 \\ \hline 803004 \\ 6424032 \\ 5621028 \\ \hline 56853486204 \end{array}$	(5.) $\begin{array}{r} 102735 \\ 273162 \\ \hline 308205 \\ 2773845 \\ 16643070 \\ \hline 28063298070 \end{array}$	(6.) $\begin{array}{r} 536712 \\ 729981 \\ \hline 4830408 \\ 43473672 \\ 391263048 \\ \hline 391789562472 \end{array}$
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ARITHMETICAL SIGNS.

Art. 86.

$$\left. \begin{array}{l} (3.) \quad 21 \div 3 \times 7 = +49 \\ \quad -1 \times 1 \div 1 \times 4 \div 2 = -2 \\ \quad 18 \div 3 \times 6 \div 4 = +9 \\ \quad 1 \times 4 \times 6 \div 8 = +3 \end{array} \right\} = 59, \text{ Ans.}$$

$$\left. \begin{array}{l} (4.) \quad 16 \times 4 \div 8 = +8 \\ \quad -7 + 48 \div 16 = -4 \\ \quad -3 - 28 \times 0 = -3 \\ \quad 24 \times 6 \div 48 = +3 \\ \quad -4 \times 9 \div 12 = -3 \end{array} \right\} = 1, \text{ Ans.}$$

$$\left. \begin{array}{l} (5.) \quad 16 \div 16 \times 96 \div 8 = +12 \\ \quad -7 - 5 + 3 = -9 \end{array} \right\} = +3.$$

$$\begin{array}{l} (27 \div 9) \div 3 - 1 = 0. \\ 91 \div 13 \times 7 - 45 - 3 = 1. \end{array}$$

Then, $3 \times 0 + 1 \times 9 = 9, \text{ Ans.}$

CONTRACTIONS IN MULTIPLICATION AND DIVISION.

Art. 88.

CASE I.

$$\begin{array}{r} (1.) \\ 3)42200 \\ \hline 14066\frac{2}{3}, \text{ Ans.} \end{array}$$

$$\begin{array}{r} (2.) \\ 656400 \\ \hline 5 \\ 8)3282000 \\ \hline 410250, \text{ Ans.} \end{array}$$

$$\begin{array}{r} (3.) \\ 6)1072400 \\ \hline 178733\frac{1}{3}, \text{ Ans.} \end{array}$$