KEY TO OLNEY'S PRACTICAL ARITHMETIC, WITH HINTS TO TEACHERS, AND FORMS OF SOLUTIONS

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649496860

Key to Olney's Practical Arithmetic, with Hints to Teachers, and Forms of Solutions by Edward Olney

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

EDWARD OLNEY

KEY TO OLNEY'S PRACTICAL ARITHMETIC, WITH HINTS TO TEACHERS, AND FORMS OF SOLUTIONS

Trieste

KEY

TO

OLNEY'S

PRACTICAL ARITHMETIC,

WITH

HINTS TO TEACHERS,

AND

FORMS OF SOLUTIONS.

By EDWARD OLNEY,

PROFESSOR OF MATHEMATICS IN THE UNIVERSITY OF MICHIGAN, AND AUTHOR OF A SERIES OF MATHEMATICAL TEXT-BOOKS.

NEW YORK:
SHELDON AND COMPANY,
8 MURRAY STREET.
1860.

PREFATORY NOTE.

THROUGH the earlier pages of this KEY, where there can be little need of teaching any one *how* to solve the examples, the chief attention has been given to hints as to methods of teaching and to forms of work. Great pains should be taken by the teacher that the pupil cultivate taste and ability for neat and elegant work on blackboard and slate. Considerable attention has been given to forms of solution and methods of explanation through all the earlier part of the book. In the latter part, little but solutions, with occasional examples of forms, has been attempted. It is thought that the KEY is sufficiently full, so that no teacher at all fitted for his work will be in the least embarrassed in the use of the book.

AUTHOR.

KEY

TO

PRACTICAL ARITHMETIC.

ADDITION.

Pages 28–31.

THESE examples are designed simply to give pupils *facility in explaining the process of addition*. They are not a tithe of what will be needed to make pupils expert and accurate in adding. A good-sized volume would be required to contain all the drill-exercises necessary to give facility in the practical process. For this, oral exercises, charts, figures on the blackboard, every possible expedient to supply drill, will be needful. See ARITHMETICAL EXERCISES, pp. 6–12.

As a specimen of the manner of using these examples, we give the following: —

Example 1.

EXPLANATION AS GIVEN BY THE PUPIL STANDING AT THE BOARD AND TRACING THE WORK WITH A POINTER, *his name being written above his work*. — "Add 427, 342, 856, and 728. I write the numbers as on the board, so that all the units shall fall in the right-hand column, all the tens in the next, and the hundreds in the next, in order that I may the more readily ascertain how many units there are in all of the numbers, then how many tens, and then how many hundreds.

WORK AS PUT ON THE BLACKBOARD. (*Pupil's Name.*)

427
342
856
728
2353

"I *begin to add* with the units column, in order that if any tens arise from adding this column I may add them in with the next column as I proceed. Adding, I say 8, 14, 16, 23; and, finding that there are 23 units in this column, I consider that 23 units is 2 tens and 3 units. Hence I write the 3 units under units column, and, proceeding to the tens column, I add the 2 tens in with it; thus, 2, 4, 9, 13, 15. Finding that there are 15 tens, I consider that 15 tens makes 1 hundred and 5 tens. Hence I write the 5 tens under tens column, and, proceeding to the hundreds column, add the 1 hundred in with it; thus, 1, 8, 16, 19, 23. Finding that there are 23 hundreds, I consider that 23 hundreds are 2 thousands and 3 hundreds. Hence I write the 3 in hundreds place, and the 2 in thousands.

"Thus I have added 427, 342, 856, and 728, since I have found one number 2353, called their sum, which is made up of all the others put together." Then the pupil should repeat definitions **38** and **32.**

In like manner each pupil should be trained to give, in good language, an explanation of every solution.

Pages 32-40.

The explanation of these solutions to be given by the pupil at the board will consist in *giving the reason for adding*, and not in giving an explanation of the *process* of adding. Thus Example 2, which will be solved *mentally*, with *a large* number of others given impromptu by the teacher, will be solved thus: The pupil rises, and says, "If James rode 8 miles and walked 3, he travelled the sum of 8 and 3 miles, which is 11 miles."

See examples of oral solutions in text-book, and also find additional exercises in the ARITHMETICAL EXERCISES, pp. 12–17.

Example 31, Page 35.

PUPIL'S EXPLANATION. — "If a merchant bought cloth for $375, and gained $50 in selling it, he sold the cloth for $375 + $50. In like manner, if he bought silk for $95, and gained $45 in selling it, he sold the silk for $95 + $45. Hence, in all, he sold cloth and silk for $375 + $50 + $95 + $45, or $565."

FOR BLACKBOARD. (*Pupil's Name.*)

375
50
95
45
565

Example 33, Page 35.

PUPIL'S EXPLANATION. — "From the time the compass was discovered to the birth of Christ was 1120 years; from the birth of Christ to the discovery of America was 1492 years; and from the discovery of America to the application of steam to propelling boats was 315 years. Hence, from the time of the invention of the compass to the time of the application of steam to the propulsion of boats was 1120 + 1492 + 315, or 2927 years."

FOR BLACKBOARD. (*Pupil's Name.*)

1120
1492
315
2927

MAKING CHANGE.

Page 39.

2. To the 25¢ I first add 5¢ by laying it out, and say "30." This means that with the 25¢ this 5¢ makes 30¢. Then I lay out 10¢, and say "40;" then another 10¢, and say "50;" then another, and say "60;" then another, and say "70;" then another, and say "80;" then another, and say "90;" then another, and say "$1.00." Thus I have counted out enough with the $1.25 to make $2.00. Then to this I count on $3 more, $1 at a time, saying, as I lay the $1 bills out, "$3," "$4," "$5."

The best method of teaching this subject is to take cardboard, and cut out pieces and mark them 1¢, 2¢, 3¢, 5¢, 10¢,

25¢, 50¢; and take slips of paper marked $1, $2, $5, etc., for bills, and ask a pupil to make change for $3.15 out of a $10 bill, etc., and let him count it out by the cards and slips, as if they were money.

SUBTRACTION.

NOTE. — The pupil should be drilled in giving such explanations of the exercises on this page as that given in the text-book, Ex. 5, p. 43, until he is completely master of the argument.

Let it be borne in mind that *three things* are important; viz., —

1. That the pupil secure a clear comprehension of the *rationale* of each process.

2. That he be able to give the argument in clear and connected language.

3. That he acquire *facility* and *accuracy* in computation.

Different kinds of drill-exercises are required to secure these several ends. See Preface to ARITHMETICAL EXERCISES.

Pages 47-51.

These exercises are designed to teach the *uses* of subtraction, not the *process*. Hence, in explaining, the pupil should tell *why* he subtracts, not *how*.

The same analysis or explanation should be given when the pupil explains from the board, as when he solves a problem mentally. Thus, —

Example 7, Page 48.

Having put the work on the blackboard, as in the margin, the pupil, standing by it (if practicable), and pointing to the numbers as he speaks of them, says, "If a person had 735 miles to travel, and has travelled 93 miles of the journey, he has yet to travel the remainder after 93 miles are subtracted from 735. 735 — 93 = 642. Hence he has yet to travel 642 miles."

BLACKBOARD.
(*Pupil's Name.*)

735
93
642

Be sure that the argument is full and clear; yet avoid stereotyped forms.

Encourage the pupil to solve all the examples he can without the use of the board.

Example 33, Page 50.

BLACKBOARD. (*Pupil's Name.*)

$175
340
520
$1035
685
$350

EXPLANATION. — "In all I borrowed $175 + $340 + $520, or $1035. Having paid $685, there remains unpaid the remainder after $685 is subtracted from $1035, or $350."

Example 36, Page 54.

BLACKBOARD. (*Pupil's Name.*)

$2500
370
$2870
3700
$830

EXPLANATION. — "If I subtract what the man spends during the year from what he receives, the remainder will be what he invests. Now he spent $2500 + $370, or $2870. Hence he had remaining to invest $3700 — $2870, or $830."

Observe that the pupil should not feel obliged to write the subtrahend *under* the minuend. He should be equally ready to reverse the order when it is more convenient. Call his attention to the closing remark in the first paragraph of "REASONS," p. 44.

Example 48, Page 51.

"The less of two numbers + the difference between them is the greater. Hence 375 + 117, or 492, is the greater."

MULTIPLICATION.

NOTE. — See remarks under Subtraction on pp. 5, 6.

Pages 59, 60.

These examples are designed to give the pupil practice in explaining (demonstrating) the *process* of multiplication.