DUBBS' COMPLETE MENTAL ARITHMETIC: A VOLUME OF CAREFULLY GRADED EXERCISES ADAPTED TO THE USE OF ALL SCHOOLS

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EUGENE L. DUBBS

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REFERENCES.

"DUBBS' ARITHMETICAL PROBLEMS."

W. H. MORGAN, - - *Superintendent Cincinnati Schools.*
JOHN B. PEASLEE, - *Ex-Superintendent Cincinnati Schools.*
G. A. CARNAHAN, *Prin. First Intermediate School, Cincinnati.*
E. H. PRICHARD, *Prin. Third Intermediate School, Cincinnati.*
J. A. SHAWAN, *Superintendent Public Instruction, Columbus, O.*
E. F. MOULTON, - - *Supervisor Cleveland Public Schools.*
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MISS KATE PIPER, *Principal Sterling School, Cleveland.*
E. J. SHIVES, - - *Superintendent Sandusky, O., Schools.*
C. C. MILLER, - *Superintendent Hamilton, O., Schools.*
JOHN BURKE, - - *Superintendent Newport, Ky., Schools.*
J. H. BROMWELL, THOS. M. DILL, } *Late Professors of Mathematics, Cincinnati Public Schools.*
A. B. JOHNSON, *Clerk Hamilton Co., O., Board of Examiners.*

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PREFACE.

OF all the branches now taught in our schools, Mental Arithmetic is perhaps the most important, inasmuch as it develops and strengthens the reasoning faculties more rapidly and thoroughly than the study of any other branch, while at the same time it insures the exact use of language. And as a knowledge of arithmetic is the basis of all future attainment in mathematical studies, it is evident that the instruction given upon this subject should be exhaustive and complete, and the student made master of every detail throughout all of its various departments.

The art of reasoning from known to unknown—from part to whole, and *vice versa*—is not only useful, but attractive; and the learner, when once fairly upon the highway of rational method to a valuable end, will readily pass from one success to another—finding pleasurable recreation rather than mystery and difficulty in his endeavors to attain higher proficiency in the mathematics beyond.

Education has become a matter of paramount importance, and the venerable pastime of "doing sums" without a *why* for rule, or a *reason* for explanation—or, in analysis,—"darkening counsel by words without knowledge" to the confusion of mind and abuse of language; —all this is rapidly giving place to improved text-books,

fresher subject-matter, and approved methods of analysis and proof. Within the last two decades great improvements have been made in many departments; and with the hopeful expectation that a higher degree of perfection may be attained, the author of this little work—induced by the request of educational friends, and encouraged by the successes of twenty years' experience—makes this contribution to the list of Mental Arithmetics, already seemingly great enough.

And in preparing what is now offered to teachers and students, he rests his claim for public favor upon the freshness of subject-matter herein contained, more rational methods of analysis, a greater number of classified problems, and, throughout the work, a golden mean between the comparatively *easy*, and the extremely *difficult* —avoiding thereby a waste of time upon that which is *valueless*, because *puerile*, or *hurtful*, because *exasperating* —a profligacy in time and language without commensurate compensation.

On the use of *signs*, an attempt is made toward greater simplicity and severer accuracy; and just here opinions adverse to the author's may arise—perhaps objection be made to the seeming encroachment upon the domain of Algebra. But the time is coming (and the advance may as well begin *now*) when *characters* for the unknown, and arithmetical equations for the expression of arithmetical thought are entirely proper in many departments of Mental Arithmetic. The mind *thinks* by *ideas*, and the mouth *speaks* by *words*; and whether the object of perception be an idea, or a group of ideas unified, and whether the language of analysis be oral or written, our mental moods and motions are more correctly represented by arithmetical equations containing signs and characters than by verbose rigmarole, and the mind proceeds just as

logically when perception rests upon a *letter*, as when upon an *entity* called *unity* or *thing*.

By this use of equations (or arithmetical sentences) several solutions by as many different pupils may be accomplished in the same time formerly consumed by one pupil in the wordy analysis; and it is claimed for this procedure that the plainest and briefest expression for mental operations *saves valuable* time, and is most likely to be *nearest to the actual logic of the mind itself.* By the old-time analysis the words spoken or printed in the solution of many problems would occupy half a page of the book, or consume several minutes in utterance.

With these prefatory remarks, the author offers this volume as a companion to his book of "Arithmetical Problems," trusting that his labors may receive that candor in criticism and fairness in trial which every conscientious professional would crave for himself.

EUGENE L. DUBBS.

Cincinnati, Ohio, August 26, 1893.

CONTENTS.

Complete Mental Arithmetic

Section I.

ADDITION.

Lesson I.

Addition is the process of finding the sum of two or more numbers.

The *sign* of addition is +, and it is called *plus*, which means *more*. It shows that the numbers between which it is placed are to be added. The sign of equality is =. It is read *equals*, or *is equal to*, and shows that the numbers between which it is placed are *equal*. Thus, 1+2=3.

ADDITION TABLE.

1+ 1= 2	2+ 1= 3	3+ 1= 4	4+ 1= 5
1+ 2= 3	2+ 2= 4	3+ 2= 5	4+ 2= 6
1+ 3= 4	2+ 3= 5	3+ 3= 6	4+ 3= 7
1+ 4= 5	2+ 4= 6	3+ 4= 7	4+ 4= 8
1+ 5= 6	2+ 5= 7	3+ 5= 8	4+ 5= 9
1+ 6= 7	2+ 6= 8	3+ 6= 9	4+ 6=10
1+ 7= 8	2+ 7= 9	3+ 7=10	4+ 7=11
1+ 8= 9	2+ 8=10	3+ 8=11	4+ 8=12
1+ 9=10	2+ 9=11	3+ 9=12	4+ 9=13
1+10=11	2+10=12	3+10=13	4+10=14
1+11=12	2+11=13	3+11=14	4+11=15
1+12=13	2+12=14	3+12=15	4+12=16