# The Mental Arithmetic

## For the Home and School



## Useful and Scientific Information
## Treated Arithmetically

## The Mental Arithmetic
## True Education Method
## Introduction and Suggestions to Parents – Teachers – Tutors

It is not because the number of text-books and arithmetic is limited that the present outline is offered, but because of the recognized lack, in those now in use, of problems which deal with numbers and subject-matter in a practical way, and which are adapted to the needs of children and youth.

The Conference on Mathematics appointed by the "Committee of Ten"* recommended "that the course in arithmetic be at the same time abridged and enriched; abridged by omitting entirely those subjects which *perplex* and *exhaust* the pupil, without affording, any really valuable mental discipline; and enriched by *a greater number of exercises* in simple calculations, and in the solution of *concrete problems.*

This shows a demand for a reformation. Why is a change necessary? "In the arithmetic of the past are mirrored the methods of instruction that prevailed in that time," and true it is that in the history of arithmetic may be traced the story of national progress. This close relationship between the arithmetic and the people is especially noticeable in Roman history, and it is because of the mold which was given to the subject by that nation, and which has been too closely adhered to since, that makes the change now necessary. What was the Roman

* The National Educational Association that met at Saratoga in July, 1892, appointed the "Committee of Ten."

**Rome** — In her greed for worldly gain, Rome stamped everything with the impress of commercialism. Her arithmetic, with all things else, received this seal of the state. Most of the text-books of to-day bear heavily along this same line, to the exclusion of other and equally practical material.

Horace Mann, with the aid of Pliny E. Chase, about 1840, attempted a reform in the arithmetical work of the schools. The

author thus expressed the plan of the work which he issued: "It derives its examples from biography, geography, phrenology, and history; from education, finance, commercial and civil statistics; from the laws of light and electricity, of sound and motion, of chemistry and astronomy, and others of the exact sciences. Trades, handicrafts, and whatever pertain to the useful arts, are laid under contribution, and are made to supply appropriate elements in the questions on which the youthful learner may exercise his arithmetical faculties."

It is refreshing to find that at the most critical period in the educational history of the United States, an arithmetic such as that of Horace Mann's should have been published. To-day the work begun by Horace Mann must be carried to completion, and no apology is necessary for the present volume, which, though elementary and mental, deals with practical subjects and matters with which every child is, or ought to be, familiar.

That there is need of a reform is shown by the character of the subject-matter in a large number of the arithmetics now in use. A casual glance is all that is necessary to show that the pupil is required to spend no little time in the solution of problems dealing with wines, tobacco, false measures, etc., which keep before the mind a side of life which is not conducive to honesty and uprightness of character. The spirit of commercialism adheres firmly to many so-called reforms in arithmetic, and in an attempt to improve upon the subject-matter of the problems, wines and tobacco are exchanged for pies and candies, etc.

Science offers a broad field for wholesome practical problems, but the work in this sphere is usually one sided, avoiding altogether the commercial problems. It has been the aim in this arithmetic to avoid extremes: the value of science study is recognized, likewise the need of accuracy in business forms.

The recent suggestions of some prominent educators will explain why some subjects are omitted which appear in other text-books.

**Suggestions to Parents – Teachers - Tutors**

"1. There should be no long division with divisors of more than two figures for ages 6-8.

" 2. Work in fractions should be made oral.

"3. The greatest common divisor should be omitted as a separate topic.

"4. Longitude and time should be omitted.

"5. Little attention should be given to problems in interest."

Mothers have long looked for a book in arithmetic which would guide them in giving the child its first lessons. The present volume is for them. They need not confine themselves to the problems given, but these are suggestive of arithmetical work to be done in the home as well as in the schoolroom.

The value of arithmetic depends upon the accuracy and speed which are developed. These qualities come as the result of thorough drills. The fundamental principles of arithmetic must become tools in the hands of the pupil, which can be used without blundering.

Attention is called to such features as —

1. The subject-matter of the problems.

2. The frequent drills.

3. The schemes for insuring accuracy and speed.

4. The emphasis laid on mental work for beginners.

5. The amount of actual work required, such as drawing, paper cutting, measuring, etc.

6. The summary of tables, and valuable information in the last pages.

The science of numbers is treated in a rigorous method, and at the same time the learner is acquiring useful and valuable information.

## Appendix – Mental Arithmetic
## True Education Method
## Suggestions for Parents – Teachers – Tutors

Teachers should read the preface, and study carefully the plan of this book. It is intended that solid work shall be done, and that pupils will have a desire created to see everything from an arithmetical standpoint. It is believed that problems which teach a truth or a useful fact will not detract from the arithmetical process. The concrete problems will set forth the principles of arithmetic in a living manner. These problems are followed by drills, which will exercise the pupils upon these numbers until they can use them as automatically as the pianist uses his fingers upon the keyboard.

Teachers should not be satisfied until accuracy is obtained. A failure now and then in giving a result is a weakness that will unfit the pupil for any position where mathematical accuracy is required. A broken link in a chain makes the entire chain useless. Give problems that are not beyond the ability of the students, and hold them upon them until they become proficient.

The teacher should use his own judgment in assigning lessons. Some of the lessons may be too long. Do not rush the pupils over them. Master every lesson before a new lesson is given, unless the class is composed of young pupils who will go through the book more than once. No pupil will be expected to enter the second book, until he has met all the requirements of this book. Yery young pupils can begin with this book. It can also be Vised for pupils in advanced grades if they are weak in mental arithmetic.

There is a great advantage in keeping the pnpils upon mental arithmetic until they become very proficient in numbers. After they have solved the problems mentally, it will do no harm to allow the problems to be solved with pencil and slate. It is easy to pass from mental to written arithmetic, bat not so easy to pass from written to mental arithmetic.

The teacher should always look over the advance lesson with the pupils, to help them to learn how to study. It is the business of the teacher to teach pupils how to study, as well as to hear recitations. Pupils should be urged to do everything that is suggested in the book. For example, when a lesson on measuring is given, the children should use their measuring rules. "Learning by doing," should be the motto. Such work will be of greater value than the catch or puzzling problems so often placed in arithmetic.

Christian education demands that all subject-matter shall be in harmony with God's law. When received into the mind it should be practiced. It is unchristian to learn truth and not practice it. To teach a pupil to determine the number of cubic feet in a pile of wood by sending him to the pile to measure it, is in accordance with the methods of Christian education, and is making the Scriptures the basis of such work. God's Word requires that we should be intelligent and skillful in all temporal affairs in which we can engage to his glory.

*Lesson I.*— These problems are intended to teach truth. Interest the pupils in the subject-matter until they voluntarily bring original problems to the class drawn from objects around them.

*Lesson II.*— The numerals used in Lesson II are the same as those employed in Lesson I. Children delight in

adding and subtracting these numbers when they have used them in concrete problems as they have in Lesson 1.

*Lesson III*—Teachers should see that each child is provided with a measuring rule or a tapeline. They will need them from this lesson onward.

*Lesson IV.*— The numerals in this drill are the same that are found in Lessons I and II. The drills have no new numerals. The children are to be drilled upon the processes until they can rapidly work the problems. The teacher should not be satisfied until the child is able to give the result of 2+2 as readily as to read the figure 4. If they are

drilled repeatedly in this way, it will be as easy for a child to determine the result of 4+6 as to read the figure 10.

*Lesson V*.— It will be necessary to provide the children with paper and scissors. Each child should have a pair, or access to a pair, as it will be necessary to do consider- able paper cutting after this. Every member of the class should do the work required.

*Lesson VI*.— It would be well to have the pupils bring in a number of original problems from the Bible. They will enjoy reducing the liquid measures used anciently to modern liquid measures.

*Lesson XVII*.— It would be well, when the pupils are first tested on the sight exercises, to record the time required. After considerable drill, notice what advancement has been made in speed.

*Lesson XX*.— This lesson suggests what may be done in the study of physiology arithmetically. Physiology is a rich field for problems. Physiological charts should be used to illustrate the facts brought out in this lesson.

*Lesson XXIII*.—The number exercise can be used many times, and will make number work a pleasure.

*Lesson XXXVII*—This exercise should be repeated very often. It is an excellent practice. See that the problems given are not beyond their ability, and then expect every answer to be correct.

*Lesson LXXVIII*—If the teacher will place the importance of the nutritive value of foods before the children, they will take a keen interest in it, and will learn the food elements and their proportions very readily. It would be well to have them go to the board, or take their slates, and as the different foods are mentioned to them, let them write down the different elements and the amount, until they are very familiar with the more ordinary articles of food. Many problems can be made based upon this information.

*Lesson LXXIX.*—Exercise in rapid thinking. This is a most excellent plan, and should be repeated often. The pupils will enjoy the exercise of running rapidly over all the tables that they have learned until they catch the proper number.

***Lesson LXXX.*** — The pupils have had many problems embracing the table of United States money, and should now be required to learn the table until they can recite it without the slightest hesitation.

***Lessons LXXXI to LXXXVII***— What has been said of Lesson LXXX is true of these lessons.

***Lesson LXXXVIII***—The combination of numbers made in the multiplication tables from the 2's to the 12's has been used throughout the entire book, first in the concrete form, and then in the drill; and the pupil should be so familiar with the combinations as to be able to give them forward or backward, or begin anywhere in the table and go either way.