

STRAYER-UPTON
PRACTICAL ARITHMETICS



THREE-BOOK SERIES

FIRST BOOK

PRACTICAL ARITHMETICS — FIRST BOOK

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George D. Strayer and Clifford B. Upton

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PREFACE

THIS series of books aims to give the child the ability to compute easily and accurately, and to enable him to interpret and solve the quantitative situations which he will meet in everyday life. In the achievement of this aim, these books incorporate the most valuable findings of modern experimentation in the teaching of arithmetic, including the results of important researches conducted by the authors themselves. These books present only those methods and materials which have been thoroughly tested in the classroom by many experienced teachers.

It is an established principle of teaching that nothing stimulates a pupil's interest so much as the satisfaction he gets from his ability to do things successfully. If he finds himself steadily perfecting new skills in arithmetic, he will look forward to his arithmetic period and will approach each new problem with intelligent interest. In accordance with this principle, these texts require the pupil to take only one new step at a time and supply him with enough exercises to assure mastery of that step before proceeding to the next one. Thus the constant stimulus of success is made possible for the pupil.

In this book the following features are worthy of note :

1. This book is written for children, in language with which they are familiar. The greatest care has been taken in the selection of the vocabulary.
2. The problems relate to the life and interests of the pupils. They are *real problems* in every sense of the word.

3. Motivation is the keynote of successful work in arithmetic. When a new topic is being presented, the pupils should know why the topic is important and how it is used in life. This fundamental principle of teaching is applied throughout this series of books by presenting every new operation or detail of a process in connection with an interesting motivating problem that treats of some situation with which the child is familiar.

4. The explanations of new principles and processes have been made as simple and clear as possible.

5. All the abstract exercises have been scientifically constructed so as to provide drill on all the fundamental number combinations, with ample repetition of those recognized as most difficult. The pupil thereby acquires that automatic mastery of the basic combinations which is so essential to rapid and accurate computation.

6. The total number of abstract exercises in this book is far greater than that usually found in elementary school texts. All these exercises have been graded with extreme care with reference to the difficulty of the steps involved.

7. The checking of computations is one of the most important habits that a child can form. Throughout this book checking is taught early in the presentation of each new operation and is required in all exercises.

8. Long division is presented in this text in an unusually simple and clear manner. In learning long division the pupil has to become acquainted with many new steps, the most difficult of which is the finding of the correct quotient figures. In this book the several steps in long

division are presented *one at a time*, with many exercises upon each step before the next one is introduced. Further, the pupil is systematically trained in the method of estimating the quotient figures so that he soon becomes able to find the correct quotient figure on *first trial* in 75% of all cases. The procedure so often found in schoolrooms, by which the pupil tries first one quotient figure and then another until he finds the correct one, is thus avoided. This improved method of long division, which is the result of many years of research and experimentation on the part of one of the authors, has been enthusiastically indorsed by many teachers who have already used it.

9. This book provides more fully and generously for diagnostic and remedial work than any other text in arithmetic. Frequent diagnostic tests are given throughout the book, with keyed references to remedial work.

10. Another feature of this book is its carefully planned instruction in problem solving. In developing the ability to solve one-step problems, the pupil is taught the more important language expressions of arithmetic that often suggest the operation that is to be performed. In teaching two-step problems emphasis is placed upon those types of two-step problems that occur most frequently in everyday life. Throughout the book there are very few pages upon which all the problems require the same operation. There are, however, many pages containing problems of several kinds, where the pupil must decide whether to add, subtract, multiply, or divide to get the answer. Thus the pupil's ability in problem solving is developed as systematically as his skill in computation.

11. A series of tests on problem solving is also provided throughout the book. These tests cover types of problem situations with which every pupil should be familiar. An important feature of these tests is that they not only measure the pupil's mastery of types of thinking frequently employed in problem solving, but they also check his ability to interpret important language expressions and technical phrases peculiar to arithmetic. These tests are arranged in groups known as Groups A, B, and C. Each group consists of three tests; thus, Group A consists of Tests A1, A2, and A3. The problems on Test A1 cover the same variety and types of problem situations and the same range of difficulty as those found on Tests A2 and A3. A pupil, therefore, should do better on the second and third tests of any group than on the first test. Thus the pupil has the satisfaction of seeing himself grow in problem-solving ability. The problems on the tests of Groups B and C cover, in similar manner, other sets of type problems.

12. Full provision has been made for pupils of varying levels of ability. For those of superior ability more difficult exercises, marked with a star (*), are provided. For pupils of average and below-average ability additional exercises may be prescribed if needed; the diagnostic tests indicate whether extra work is necessary and also give references to suitable materials.

GEORGE DRAYTON STRAYER
CLIFFORD BREWSTER UPTON

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CHAPTER I

PLAYING TENPINS

These children are playing tenpins.

1. Grace rolls a ball and knocks down 5 pins; then she rolls another ball and knocks down 3 pins. Her score is 5 and 3. Frank says that this makes 8. Is he right?

$$\begin{array}{r} 5 \\ 3 \\ \hline 8 \end{array}$$

2. The numbers below show how many pins other children knocked down. Find their scores.

Edna	Anna	Mary	John	Fred	Joe	Will	Bob
4	8	2	1	5	9	7	6
<u>3</u>	<u>1</u>	<u>3</u>	<u>4</u>	<u>2</u>	<u>1</u>	<u>2</u>	<u>2</u>

HOW FAR CAN YOU COUNT?



1. John is counting the pennies in his bank. He says he has 24 pennies. Can you count to 24? Try it.

2. Count all the children in your class.

3. Count all the books the teacher has.

4. Count from 1 to 100.

5. Count from 10 to 30.

6. Try to count backward from 10 to 1.

7. Count by 2's to 20. Count by 2's to 100.

SOMETHING NEW

A new way to write "2 and 4 are 6" is like this:

$$2 + 4 = 6$$

+ means and or plus

= means are or equals

When you find that $2 + 4 = 6$, you are adding. 6 is called the sum.

Tell the sums of these numbers:

- | | | | |
|----------------|----------------|----------------|----------------|
| 1. $2 + 1 = ?$ | 2. $5 + 5 = ?$ | 3. $2 + 6 = ?$ | 4. $4 + 4 = ?$ |
| $4 + 5 = ?$ | $4 + 1 = ?$ | $4 + 2 = ?$ | $3 + 1 = ?$ |
| $3 + 7 = ?$ | $7 + 1 = ?$ | $7 + 3 = ?$ | $2 + 8 = ?$ |



WHAT SCORE CAN YOU MAKE?

Play this game. Write the numbers on paper and pin them on the baskets. You have two bean bags. If you throw a bag into a basket, the number on the basket tells how much it counts. If the bag falls on the floor, it counts zero. Zero is written like this, 0, and means *not any* or *nothing*.

1. Elizabeth throws one bag into 5 and one into 2. What is her score?

2. Tom throws one bag into 4. As the other bag falls on the floor, it counts 0. How many are $4 + 0$?

3. Fred's first bag falls on the floor. His second one also falls on the floor. Fred's score is $0 + 0$. How many is that?

4. Here are the scores of some of the other boys and girls. Add them quickly:

<u>5</u>	<u>0</u>	<u>4</u>	<u>2</u>	<u>5</u>	<u>0</u>	<u>4</u>	<u>3</u>
<u>3</u>	<u>5</u>	<u>3</u>	<u>5</u>	<u>5</u>	<u>0</u>	<u>5</u>	<u>0</u>

PROBLEMS WITHOUT NUMBERS

Tell whether you would add, subtract, multiply, or divide to get the answer:

1. If you know the amount of money you have and the price of a book that you are going to buy, how do you find the amount of money you will have left?
2. If you know the number of miles your father drove his car each day last week, how do you find the number of miles he drove in all?
3. If you know the number of days you spent on a farm last summer, how do you find the number of weeks you were there?
4. If you know the number of dollars a coat costs and also the number of dollars you now have, how do you find how much more money you need in order to be able to buy the coat?
5. If you know the number of inches in a foot, how do you find the number of inches in several feet?
6. If you know the cost of each thing you had for lunch to-day at school, how do you find the cost of your whole lunch?
7. If you know the cost of the Christmas present three children want to give their mother, and also that they will share the cost equally, how do you find each one's share of the cost?
8. If you know the cost of one circus ticket, how do you find the cost of several tickets?

MIXED PRACTICE

1. Add these numbers: 642, 173, and 159.
2. Find the difference between 750 and 609.
3. What is the sum of \$2.38, \$3.65, and \$.92?
4. How many cents are there in 3 quarters?
5. How many inches are there in 1 ft. 3 in.?
6. Which is more, 6 oz. of butter or $\frac{1}{2}$ lb. of butter?
7. 129 less 83 is what? 8. 49 plus 72 is what?

<i>Divide</i>	<i>Subtract</i>	<i>Add</i>	<i>Multiply</i>
9. $9 \overline{)3807}$	10. $\begin{array}{r} 8000 \\ -4927 \\ \hline \end{array}$	11. $\begin{array}{r} \$18.75 \\ +3.06 \\ \hline \end{array}$	12. $\begin{array}{r} 318 \\ \times 7 \\ \hline \end{array}$

CAN YOU TELL THE MISSING WORD?

1. When you have to find the sum of two numbers, you
2. When you have to find the quotient of two numbers, you
3. When you have to find the difference between two numbers, you
4. When you have to find the product of two numbers, you
5. When you find one third of a number, you
6. When you find how much larger one number is than another, you

*SOME TRICKS WITH NUMBERS

Uncle Joe is going to show you some interesting tricks with numbers. Do just as he tells you.

1. Multiply 115 by 9, but don't tell Uncle Joe the answer.

2. Now watch Uncle Joe do his trick. First he multiplies 115 by 3, which gives 345; then he multiplies 345 by 3. Does Uncle Joe get the same answer that you did when you multiplied by 9?

$$\begin{array}{r} 115 \\ \times 3 \\ \hline 345 \\ \times 3 \\ \hline 1035 \end{array}$$

3. Try Uncle Joe's trick on these numbers. Then multiply each number by 9. Do you get the same answer both ways?

217 118 245 267 158 230

This trick looks like magic, doesn't it? Uncle Joe says that the reason it works is because $3 \times 3 = 9$.

4. Now Uncle Joe will show you another trick. Multiply 235 by 6, but do not tell him the answer yet.

5. Now do as Uncle Joe tells you. First multiply 235 by 2 and then multiply the answer by 3, as shown here. You get the same answer that you did when you multiplied by 6 because $2 \times 3 = 6$.

$$\begin{array}{r} 235 \\ \times 2 \\ \hline 470 \\ \times 3 \\ \hline 1410 \end{array}$$

6. Try Uncle Joe's trick on these numbers. Then multiply each number by 6. Do you get the same answer both ways?

239 157 349 168 451 277

PROBLEMS

1. Mr. Brown is buying railroad tickets for 6 people. At \$2.76 each, how much do the tickets cost him?

2. How many rooms are there in a 7-story apartment house which has 33 rooms on each floor?

3. A rural baker travels 42 miles each day to cover his route. How many miles does he travel in 8 days?

4. Mr. Smith's delivery car traveled 1890 miles last month. How many gallons of gasoline did he use if the car goes 7 miles on 1 gallon?

5. 48 pupils were divided into groups of 5 to play a game. How many groups were there? Were any pupils left out?

6. Mrs. Harris lost a wrist watch that was worth \$150. She offered $\frac{1}{3}$ of the value of the watch as a reward to the finder. How much was the reward?

7. Ida's 9 friends give \$.75 each to buy her a birthday present. How much can they spend for it?

8. A farmer gets 128 quarts of milk from his cows. How many gallons is this?

9. Mrs. Wilson buys a sewing machine for \$52.00. She agrees to pay for it by paying the same amount each month for the next 8 months. How much must she pay each month?

DIAGNOSTIC TEST

Multiply the following. If you need more practice, turn to the Help Pages.

					HELP PAGES
1. $\begin{array}{r} 46 \\ \underline{9} \end{array}$	$\begin{array}{r} 84 \\ \underline{5} \end{array}$	$\begin{array}{r} 67 \\ \underline{6} \end{array}$	$\begin{array}{r} 75 \\ \underline{9} \end{array}$	$\begin{array}{r} 94 \\ \underline{7} \end{array}$	241
2. $\begin{array}{r} 86 \\ \underline{3} \end{array}$	$\begin{array}{r} 93 \\ \underline{8} \end{array}$	$\begin{array}{r} 47 \\ \underline{4} \end{array}$	$\begin{array}{r} 28 \\ \underline{9} \end{array}$	$\begin{array}{r} 87 \\ \underline{8} \end{array}$	241
3. $\begin{array}{r} \$5.76 \\ \underline{5} \end{array}$	$\begin{array}{r} \$2.71 \\ \underline{7} \end{array}$	$\begin{array}{r} \$8.16 \\ \underline{4} \end{array}$	$\begin{array}{r} \$3.86 \\ \underline{7} \end{array}$		235
4. $\begin{array}{r} \$4.58 \\ \underline{6} \end{array}$	$\begin{array}{r} \$6.12 \\ \underline{8} \end{array}$	$\begin{array}{r} \$7.24 \\ \underline{3} \end{array}$	$\begin{array}{r} \$4.52 \\ \underline{8} \end{array}$		235

Divide the following:

5. $5 \overline{)605}$	$2 \overline{)682}$	$3 \overline{)228}$	$4 \overline{)\$17.20}$	178
6. $3 \overline{)927}$	$5 \overline{)195}$	$4 \overline{)248}$	$5 \overline{)\$20.35}$	178
7. $7 \overline{)247}$	$3 \overline{)139}$	$5 \overline{)329}$	$4 \overline{)\$43.51}$	215
8. $3 \overline{)469}$	$7 \overline{)507}$	$2 \overline{)179}$	$6 \overline{)\$40.15}$	215
9. $9 \overline{)443}$	$7 \overline{)448}$	$8 \overline{)136}$	$9 \overline{)\$64.08}$	244
10. $6 \overline{)924}$	$8 \overline{)341}$	$7 \overline{)763}$	$6 \overline{)\$19.25}$	244

PROMOTION TEST

If you can do all these things, you are ready for the next grade:

1. Give the answers orally to all the 100 addition combinations on page 18 in 3 minutes.
2. Give the answers orally to all the 100 subtraction combinations on page 24 in 3 minutes.
3. Give the answers orally to all the 100 multiplication combinations on page 247 in 3 minutes.
4. Give the answers orally to all the 90 division combinations on page 248 in 3 minutes.
5. Make change from \$1.00 for these amounts:
8¢ 17¢ 35¢ 61¢ 78¢ 49¢

Add the following and check the work:

6. $\begin{array}{r} \$2.63 \\ \underline{4.85} \end{array}$	$\begin{array}{r} \$4.32 \\ \underline{2.49} \end{array}$	$\begin{array}{r} \$1.56 \\ \underline{2.77} \end{array}$	$\begin{array}{r} \$2.94 \\ \underline{7.79} \end{array}$	$\begin{array}{r} \$5.87 \\ \underline{1.28} \end{array}$
7. $\begin{array}{r} \$3.80 \\ \underline{5.25} \end{array}$	$\begin{array}{r} \$5.27 \\ \underline{7.59} \end{array}$	$\begin{array}{r} \$8.76 \\ \underline{6.24} \end{array}$	$\begin{array}{r} \$6.96 \\ \underline{.62} \end{array}$	$\begin{array}{r} \$2.93 \\ \underline{6.09} \end{array}$
8. $\begin{array}{r} \$6.39 \\ 1.94 \\ \underline{6.25} \\ 4.53 \\ \underline{3.48} \end{array}$	$\begin{array}{r} \$2.29 \\ 6.86 \\ \underline{9.71} \\ 1.11 \\ \underline{3.66} \end{array}$	$\begin{array}{r} \$6.39 \\ 7.05 \\ \underline{.76} \\ 6.51 \\ \underline{3.66} \end{array}$	$\begin{array}{r} \$4.95 \\ 6.09 \\ \underline{2.75} \\ 1.84 \\ \underline{4.67} \end{array}$	$\begin{array}{r} \$4.69 \\ 3.74 \\ \underline{.75} \\ 2.45 \\ \underline{3.89} \end{array}$

PROMOTION TEST

If you can do all these things, you are ready for the next grade:

1. Count by 3's to 48. Count by 2's to 100.

Subtract the following and check your work:

2. $\begin{array}{r} \$48.59 \\ \underline{12.97} \end{array}$	$\begin{array}{r} \$97.15 \\ \underline{66.96} \end{array}$	$\begin{array}{r} \$15.38 \\ \underline{\quad .99} \end{array}$	$\begin{array}{r} \$36.60 \\ \underline{\quad 7.58} \end{array}$
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3. $\begin{array}{r} \$52.77 \\ \underline{16.88} \end{array}$	$\begin{array}{r} \$80.00 \\ \underline{37.45} \end{array}$	$\begin{array}{r} \$37.10 \\ \underline{19.28} \end{array}$	$\begin{array}{r} \$69.77 \\ \underline{23.89} \end{array}$
--	---	---	---

Multiply the following and check your work:

4. $\begin{array}{r} 206 \\ \underline{\quad 5} \end{array}$	$\begin{array}{r} 182 \\ \underline{\quad 5} \end{array}$	$\begin{array}{r} 297 \\ \underline{\quad 4} \end{array}$	$\begin{array}{r} \$5.17 \\ \underline{\quad 6} \end{array}$	$\begin{array}{r} \$5.18 \\ \underline{\quad 3} \end{array}$
--	---	---	--	--

5. $\begin{array}{r} 450 \\ \underline{\quad 3} \end{array}$	$\begin{array}{r} 809 \\ \underline{\quad 6} \end{array}$	$\begin{array}{r} 721 \\ \underline{\quad 9} \end{array}$	$\begin{array}{r} \$6.50 \\ \underline{\quad 2} \end{array}$	$\begin{array}{r} \$6.25 \\ \underline{\quad 7} \end{array}$
--	---	---	--	--

6. $\begin{array}{r} 648 \\ \underline{\quad 4} \end{array}$	$\begin{array}{r} 394 \\ \underline{\quad 2} \end{array}$	$\begin{array}{r} 963 \\ \underline{\quad 3} \end{array}$	$\begin{array}{r} \$5.39 \\ \underline{\quad 5} \end{array}$	$\begin{array}{r} \$2.15 \\ \underline{\quad 2} \end{array}$
--	---	---	--	--

Divide the following and check the work:

7. $2 \overline{)50}$	$8 \overline{)656}$	$2 \overline{)700}$	$4 \overline{)904}$	$6 \overline{)1456}$
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8. $3 \overline{)77}$	$3 \overline{)162}$	$4 \overline{)839}$	$7 \overline{)644}$	$7 \overline{)1260}$
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9. $5 \overline{)68}$	$5 \overline{)475}$	$9 \overline{)450}$	$5 \overline{)205}$	$5 \overline{)2020}$
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CHAPTER IV

THE SWIMMING POOL

1. To-day 45 boys and 33 girls bought tickets for the pool. How many tickets were sold to-day?
2. This summer Alice paid \$.75 for tickets to the pool. Jim paid \$1.20 and Joe paid \$1.35. How much did it cost for tickets for the three children?
3. Next week a prize will be given to the child who is the fastest swimmer. There are 29 boys and 17 girls who are going to try to win the prize. How many children will be in the race?
4. The pool is 96 feet long. If Jack swims the length of the pool and back, how far does he swim?