STRAYER-UPTON
PRACTICAL ARITHMETICS
SECOND BOOK
PART 1

BY

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YESTERDAY'S CLASSICS

ITHACA, NEW YORK

This edition, first published in 2022 by Yesterday's Classics, an imprint of Yesterday's Classics, LLC, is an unabridged republication of the text originally published by American Book Company in 1934. For the complete listing of the books that are published by Yesterday's Classics, please visit www.yesterdaysclassics.com. Yesterday's Classics is the publishing arm of the Gateway to the Classics which presents the complete text of hundreds of classic books for children at www.gatewaytotheclassics.com.

ISBN: 978-1-63334-083-1

Yesterday's Classics, LLC
PO Box 339
Ithaca, NY 14851

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 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 computations 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 constantly required in connection with all exercises.

8. A series of 84 Improvement Tests covering whole numbers, fractions, and decimals is included. These tests provide the most efficient and interesting means yet devised for keeping alive skills already learned while the pupil is studying new topics. For example, when the pupil is studying the addition and subtraction of fractions, the Improvement Tests provide the drill on whole numbers that is necessary to keep these skills active. These tests have the further advantage that the total time required to give and score them is less than 30 minutes a week thus leaving ample time to be devoted to the new work of the grade. For further information concerning these tests, see pages 16-20 of this book.

9. This book provides an exceptionally full and generous program of diagnostic and remedial work. Frequent diagnostic tests are given throughout the book, with keyed references to remedial exercises.

10. The carefully planned instruction in problem solving, which was given in the First Book of this series, is continued in this book. In addition to a large number of one-step problems in which the technical language expressions of arithmetic are frequently reviewed, special attention is now given to the solution of problems of two or more steps, with emphasis upon those types of two-step and three-step problems that occur most frequently in everyday life.

There are very few pages in the book on which all the problems may be worked by using the same operation, such as addition only. There are, on the other hand, many pages containing problems of different kinds, each of which the pupil has to study carefully before selecting the operation to be performed. By developing the pupil's initiative in this way and also by centering attention on the more common types of problems, as stated above, 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. This book contains many interesting projects and units of work involving quantitative relationships.

13. Full provision has been made for pupils of varying levels of ability. For those of average and below-average ability a large number of well-graded exercises is provided. For pupils of superior ability more difficult exercises marked with a star (✶), are furnished. The diagnostic tests indicate the needs of each pupil and give references to suitable remedial work.

George Drayton Strayer

Clifford Brewster Upton

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Chapter I

CHAPTER I

OUR NATURE STUDY CLUB

1. Our Nature Study Club has 35 members who pay weekly dues of $.05 each. How much does Ted, the treasurer, collect in dues in 1 week? in 4 weeks?

2. During the first four weeks Ted pays out the following amounts. How much does he pay in all?

(*a*) $1.15 for glass and cement to make an aquarium.
(*b*) $1.50 for bird records for the phonograph.
(*c*) $.75 for a blue print outfit.
(*d*) $.49 for a box of blue print paper.
(*e*) $2.75 to rent a motion picture film of wild animals.

3. If the total amount Ted receives during the four weeks is $7.00, how much has he left after paying out the amounts mentioned in ex. 2?

The next page shows how Ted keeps his accounts.

TED'S ACCOUNT BOOK

As treasurer of the Nature Study Club, Ted keeps this account of all the money he receives and spends.

Received					Paid Out				
Sept.	12	Dues	1	75	Sept.	15	Glass and cement	1	15
"	19	Dues	1	75	"	20	Phonograph records	1	50
"	26	Dues	1	75	"	28	Blue print outfit		75
Oct	3	Dues	1	75	Oct.	2	Blue print paper		49
					"	6	Film rent	2	75
						6	Cash on hand		36
			7	00				7	00
Oct	6	Cash on hand		36					

How much in all does Ted receive during the four weeks? How much in all does he spend?

Ted subtracts the \$6.64 he spends from the \$7.00 he receives, which gives \$.36 as the amount of cash he *should have* on hand. This is his **balance.** He counts his cash and finds that he really has \$.36 left. Then he writes " Cash on hand, \$.36 " on the right side of his book, as shown above, and adds that side. The sum is \$7.00 and his book *balances* because the left side also totals \$7.00. He draws double lines under \$7.00 on both sides to show that the account above these lines is correct.

He now starts a new section of his account by writing " Cash on hand, \$.36 " on the left side under \$7.00.

In balancing his book, if Ted finds that he has not \$.36 left, he tries to discover his mistake. If he has *less* than \$.36, he may have forgotten to record some amount that he has spent; if he has *more* than \$.36, he may have failed to record some amount that he has received.

TED CHECKS HIS ADDITION

Ted finds that the best way to add is to begin at the bottom of each column and add up. After obtaining the sum, he checks the work by beginning at the top of each column and adding down. If he gets the same sum each time, he considers that his work is correct.

Exercises

1. Here is the next section of Ted's account. Copy it, balance the account, and check the addition.

Received					Paid Out				
Oct.	6	Cash on hand		36	Oct.	14	Book of Birds	1	45
"	10	Dues	1	75	"	18	Rock specimens	2	40
"	17	Dues	1	75	"	25	Postage		12
"	24	Dues	1	75	"	31	Trip to park	2	50
"	31	Dues	1	75	Nov.	1	Cash on hand		

2. For the next four weeks Ted starts with a balance of \$.89 and receives \$1.75 in dues each week. He pays \$.65 for express on lantern slides, \$.95 for a class excursion, \$1.35 for "Book of Trees," \$.85 for lumber for bird houses, \$.75 for fish for the aquarium. Insert dates and make out and balance Ted's account. Check the work.

3. On Dec. 1 Ted has a balance of \$3.34. On Dec. 5 he collects dues of \$1.75 and each of the next two weeks he collects the same amount. He spends \$.75 for food for squirrels, \$1.65 for paper for costumes for a bird play, \$.95 for pictures of trees, \$.65 for express, \$1.00 for a prize for the best photograph of animals. Balance the account to find the amount he should have left. Check the work.

ANNA'S CASH BOOK

1. Here are two pages from Anna's cash book. On the left-hand page she writes the amounts she receives. On the right-hand page she writes what she spends.

Received					Paid Out				
Sept.	1	Cash on hand	2	06	Sept.	7	Story book	1	07
"	5	Allowance	1	00	"	12	Ice cream		10
"	9	For old reader		35	"	18	Picnic		35
"	11	Errands		30	"	23	Red Cross Fund		40
"	19	Allowance	1	00	"	24	set of paints	1	04
"	26	From Aunt Jess		50	"	30	Cash on hand		

Balance Anna's account to show that she should have $2.25 on hand on Sept. 30.

2. On Sept. 30 Anna counts her money and finds that she has only $2.15 (see ex. 1). Grace says that this might mean that she lost $.10. Is Grace right?

3. Anna is sure that she did not lose any money. Then she remembers that she spent $.10 for candy on Sept. 29. How does this change her account?

4. Show how Anna should keep her cash account for January. She has $1.19 on hand on Jan. 1. She receives $5.00 as a New Year's present, $1.75 on Jan. 7 for running errands, and $1.91 on Jan. 16 for helping her aunt. She spends $2.25 on Jan. 5 for a pair of skates, $.75 on Jan. 16 for a present for her sister, $.84 on Jan. 19 for a game, and $.65 on Jan. 24 for ribbon. How much cash should she have on hand on Jan. 31?

5. Keep a cash account as Anna did. As soon as you receive or spend any money, make a record of it.

COLUMN ADDITION

Add the following and check the work:

1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**
4	3	6	9	5	9	9	7
9	6	7	0	1	3	2	9
8	7	0	8	8	1	0	1
2	4	7	2	4	7	8	5
3	0	2	2	8	7	7	3

9.	**10.**	**11.**	**12.**	**13.**	**14.**	**15.**	**16.**
9	8	5	7	5	4	3	3
0	2	0	2	2	4	0	1
8	3	2	1	1	0	6	4
3	8	6	8	6	6	3	9
3	8	8	9	9	7	9	6

17.	**18.**	**19.**	**20.**	**21.**	**22.**	**23.**	**24.**
6	5	4	8	9	4	7	9
5	5	2	6	4	5	6	3
5	1	3	1	0	7	3	7
4	8	5	7	9	1	7	2
6	3	9	6	5	6	5	1

25.	**26.**	**27.**	**28.**	**29.**	**30.**
49	29	22	93	68	72
33	59	78	16	95	80
84	12	44	62	38	61
81	80	96	80	90	79
42	70	42	57	31	29

31.	**32.**	**33.**	**34.**	**35.**	**36.**
31	97	54	62	16	37
63	27	62	21	57	71
40	50	76	10	44	16
48	33	31	69	65	57
58	18	81	74	87	23

DRILL IN ADDITION

Add orally, starting at the bottom. Check by adding down:

1.	2.	3.	4.	5.	6.	7.	8.
8	7	9	3	4	3	8	8
4	5	6	4	6	8	2	0
2	0	6	5	5	4	4	4
5	9	8	8	0	6	9	8
0	6	2	6	9	7	8	6
9	7	7	2	7	9	4	5
5	3	8	5	2	0	4	7

Copy and add, starting at the bottom. Check the work:

9.	10.	11.	12.	13.	14.
89	19	83	31	70	66
43	93	29	16	33	72
20	77	28	55	62	81
69	45	32	28	84	46
98	78	64	57	11	42
53	32	68	34	19	57

15.	16.	17.	18.	19.	20.
99	97	27	92	24	43
70	41	96	59	61	17
75	47	61	94	36	88
31	98	42	25	80	50
60	60	80	75	58	78
47	21	92	10	59	98

21.	22.	23.	24.	25.	26.
388	680	360	569	390	968
330	575	457	792	915	287
661	394	778	725	645	626
125	203	303	502	473	250
674	882	544	396	779	183

COLUMN ADDITION

Add the following and check the work:

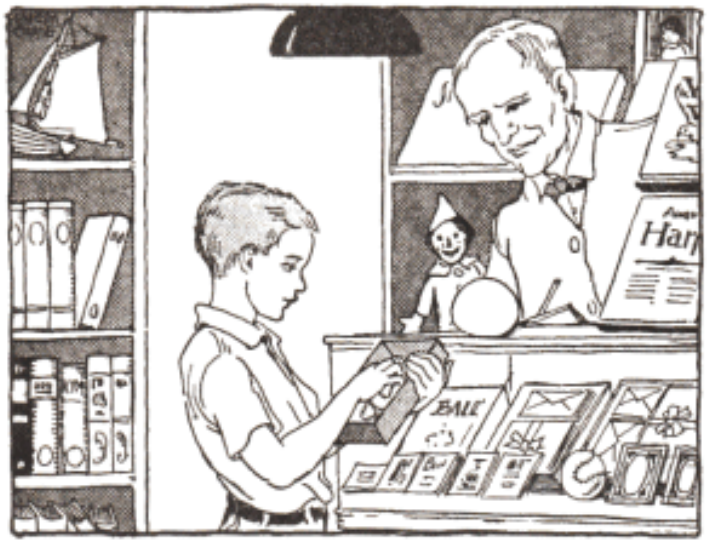
1.	**2.**	**3.**	**4.**	**5.**	**6.**
294	470	522	226	822	829
841	133	937	590	584	606
598	658	731	616	364	145
430	472	630	360	731	878
122	319	819	658	875	910
373	470	259	789	569	710

7.	**8.**	**9.**	**10.**	**11.**	**12.**
505	524	873	198	953	694
424	772	283	606	521	348
454	588	135	962	723	311
920	349	779	380	836	740
809	990	940	536	114	753
677	944	261	709	616	257

13.	**14.**	**15.**	**16.**	**17.**	**18.**
841	924	719	610	322	259
350	842	516	332	477	916
186	903	971	916	793	112
626	460	482	887	541	616
112	734	960	480	220	550
975	507	609	203	473	405
685	798	598	855	658	154

19.	**20.**	**21.**	**22.**	**23.**	**24.**
603	722	716	473	820	881
314	598	527	300	607	213
134	174	306	438	813	919
518	415	460	544	233	660
890	870	851	413	297	722
203	101	452	810	120	637
651	729	845	345	534	207
986	686	214	809	696	727

THE EXPENSES OF A TOY STORE



1. Mr. Grant runs a small toy and stationery store in Johnstown. During August he spends \$276.20 for supplies, \$10.14 for lighting, \$60.00 for rent, \$9.00 for advertising, and \$37.60 for help. How much are the expenses of his store during August?

Here are the August expenses of some other small stores. Copy them and find the total expenses of each store. Check the answers:

2.	\$167.05	**3.**	\$178.37	**4.**	\$146.26	**5.**	\$221.93
	39.54		13.03		20.59		77.80
	16.82		75.69		86.69		54.79
	85.78		68.47		51.90		65.58
6.	\$189.49	**7.**	\$101.95	**8.**	\$200.94	**9.**	\$330.40
	33.23		24.30		69.23		26.96
	20.41		51.74		53.80		42.57
	14.68		68.92		12.77		99.08
	47.89		42.39		30.95		74.80
10.	\$330.77	**11.**	\$162.51	**12.**	\$257.80	**13.**	\$ 79.67
	158.83		350.09		43.52		110.67
	80.40		46.39		40.44		188.06
	64.18		71.53		18.07		45.23
	25.68		26.00		189.16		89.59

ANSWERING QUESTIONS BY SUBTRACTING

1. Emma had \$3. She gave \$.14 to her little brother. How much had Emma left?

First write \$3 as \$3.00. Then subtract \$.14 from \$3.00, making sure that the decimal points are under each other.

\$3.00	**Minuend**
.14	**Subtrahend**
\$2.86	**Remainder**

You find that Emma had \$2.86 left.

To *check* the answer, add \$2.86 and \$.14, beginning at the bottom and adding up, thus: $6 + 4 = 10$; 1 (carried) $+ 8 + 1 = 10$; 1 (carried) $+ 2 = 3$. The sum is \$3.00, which is the same as the minuend; hence the work is right.

In the above problem, \$2.86 is called the **remainder.**

2. Tony has saved \$4.20. Jim has saved \$2.57. How much less has Jim saved than Tony?

Here you subtract to find the *difference* between Tony's and Jim's savings.

\$4.20	
2.57	
\$1.63	**Difference**

3. Alfred has \$6.42. He needs \$8.50 to buy a coaster. How much more does he need?

4. Mollie has \$7.45. She spends \$2 and puts the rest in a savings bank. How much does she put in the bank?

5. Abraham Lincoln was born in 1809. He was killed in 1865. How old was he at the time of his death?

6. In 1927 Lindbergh flew about 3647 mi., without stopping, in going from New York to Paris. A few weeks later Chamberlin flew about 4400 mi. from New York to Germany. How much longer was Chamberlin's trip than Lindbergh's?

7. Subtraction answers several kinds of questions, like "How much is left?" "How much farther?" and "What is the difference?" Make up six subtraction problems, each having a different kind of question.

A SUBTRACTION RACE

Do not copy these problems. Place the edge of your paper under the top row of problems. Write the answers along that edge of the paper, checking your work as you do it. Then fold the answers under and write the next row of answers along the folded edge.

As soon as one pupil finishes, the entire class stops. The one who then has the most problems correct wins.

Subtract the following and check the work:

1. 2967 − 585	**2.** 6384 − 747	**3.** 7475 − 3994	**4.** 6354 − 5549
5. 7253 − 324	**6.** 8252 − 482	**7.** 9629 − 7656	**8.** 9215 − 2631
9. 4850 − 170	**10.** 4126 − 881	**11.** 5001 − 3331	**12.** 7009 − 5247
13. 5647 − 388	**14.** 8446 − 3666	**15.** 7275 − 2299	**16.** 8910 − 1429
17. 8913 − 972	**18.** 3263 − 1871	**19.** 8526 − 7894	**20.** 5419 − 2888
21. 4301 − 750	**22.** 5800 − 2611	**23.** 8000 − 2546	**24.** 7912 − 4886
25. 9094 − 765	**26.** 9319 − 3650	**27.** 4314 − 3491	**28.** 3209 − 1669

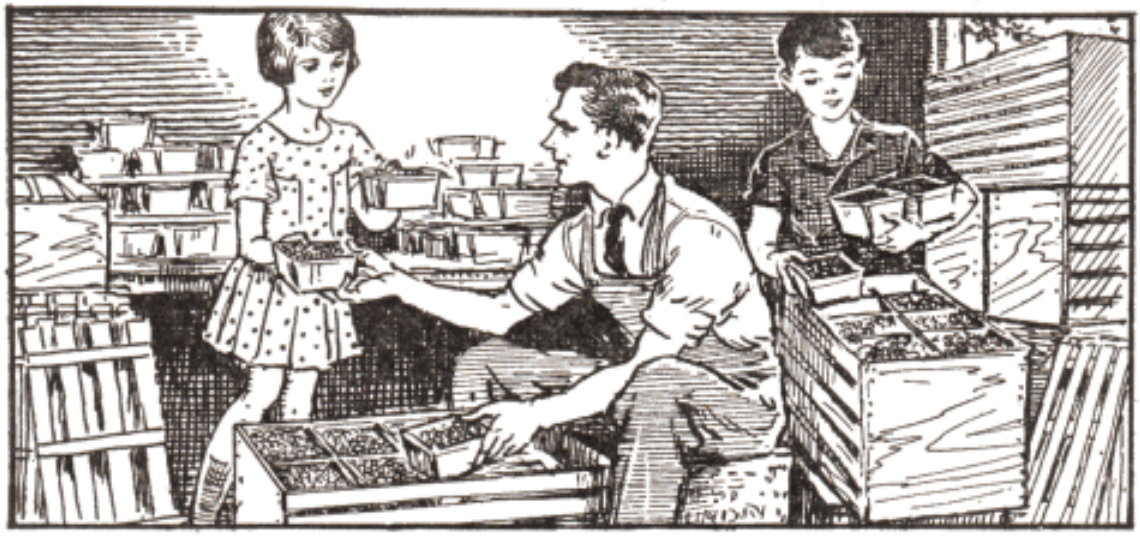
PRACTICE IN SUBTRACTION

Subtract the following and check the work:

1. \$77.64 47.87	**2.** \$80.00 19.05	**3.** \$50.00 23.83	**4.** \$76.32 57.75
5. \$70.04 35.66	**6.** \$82.43 44.87	**7.** \$66.34 19.48	**8.** \$51.33 14.36
9. \$73.41 15.40	**10.** \$93.64 29.69	**11.** \$82.32 22.86	**12.** \$40.70 11.02
13. \$41.78 9.99	**14.** \$32.81 7.89	**15.** \$50.03 7.63	**16.** \$87.44 8.95

Subtract the following and check the work:

17. \$361.03 237.44	**18.** \$921.27 668.89	**19.** \$860.00 141.25	**20.** \$796.21 658.35
21. \$700.00 289.72	**22.** \$924.34 438.66	**23.** \$534.25 399.59	**24.** \$770.10 363.06
25. \$627.48 78.77	**26.** \$392.78 6.79	**27.** \$300.08 46.48	**28.** \$821.65 8.67
29. \$554.35 96.75	**30.** \$660.00 3.51	**31.** \$132.87 89.89	**32.** \$473.43 95.45



ON A FRUIT FARM

1. Bob and Mary spent the summer with Uncle Ned on his fruit farm. There are 25 acres of fruit trees, 14 acres of berry vines and bushes, and 17 acres of grain fields. How many acres are there in Uncle Ned's farm?

2. One of the biggest crops he has is his peach crop. Last year he shipped 1895 bu. of peaches to market and this year he shipped 1977 bu. How many more bushels did he ship this year than last year?

3. Mary picked 53 qt. of strawberries and 87 qt. of blackberries while she was on the farm. How many quarts of berries did she pick in all?

4. Bob picked 217 qt. of berries in all. How many more quarts did he pick than Mary?

5. They helped Uncle Ned pack berries for the market. Uncle Ned packed 43 crates, Bob packed 27 crates, and Mary packed 32 crates. How many crates in all did they pack to send to market?

6. Bob weighed 81 lb. when he came to the farm and 88 lb. when he left. How many pounds did he gain?

HOW WE MAKE CHANGE

Fred is a clerk in a grocery store. Anna buys a dozen eggs for 38¢ and gives him a 1-dollar bill.

To make change for Anna, Fred first thinks 38¢; then he takes 2 cents and thinks 40¢; then he takes a dime and thinks 50¢; then he takes a half dollar and thinks $1. As he gives Anna the coins, he counts them again, saying, "38, 40, 50, $1." Anna counts with him to make sure that the change is right.

To check your change, start with the cost of your purchase and add to it the coins that the clerk gives you. The sum should equal the amount that you gave the clerk.

Making Change

1. Tess buys a basket of apples for 69¢. She gives the clerk $1. He gives her a cent, a nickel, and a quarter. Count the change as the clerk did. Is it right?

2. Martha buys a 7-cent notebook and gives the clerk a quarter. The clerk gives her 3 cents, a nickel, and a dime. Count out the change with the clerk.

3. Edward buys 15¢ worth of rolls and hands the clerk $1. The clerk gives him 2 nickels, 2 dimes, and a half dollar as change. Count the change. Is it right? What change should the clerk give Edward?

Tell what coins you would give as change for $1 *on each of these purchases:*

4. 83¢ **6.** 59¢ **8.** 91¢ **10.** 72¢ **12.** 68¢ **14.** 60¢

5. 22¢ **7.** 41¢ **9.** 29¢ **11.** 33¢ **13.** 9¢ **15.** 16¢

Make change from $5 *for these purchases:*

16. $1.23 **17.** $2.07 **18.** $3.12 **19.** $2.28 **20.** $3.64