

STRAYER-UPTON
PRACTICAL ARITHMETICS
SECOND BOOK

BY

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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 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

CONTENTS

Chapter I

CASH ACCOUNTS	1
ADDITION AND SUBTRACTION	5
IMPROVEMENT TESTS	16
MULTIPLICATION AND DIVISION	21
PROBLEM SOLVING	52
READING AND WRITING NUMBERS	60
FRACTIONS	62
ADDING AND SUBTRACTING	
FRACTIONS	69
MULTIPLYING FRACTIONS	116
REVIEW	141

CONTENTS

Chapter II

DIVIDING FRACTIONS	145
PROBLEMS	157
COMPARING NUMBERS	163
BILLS	176
MEASURES	182
AREAS	198
SCALE DRAWING	202
VOLUMES	204
READING AND WRITING DECIMALS ...	210
ADDING AND SUBTRACTING	
DECIMALS	214
MULTIPLYING DECIMALS	223
GRAPHS	232
DIVIDING DECIMALS	241
REVIEW	248

CONTENTS

Chapter III

IMPROVEMENT TESTS	257
REVIEW OF WHOLE NUMBERS	262
PROBLEM SOLVING	279
FRACTIONS	285
ADDING AND SUBTRACTING	
FRACTIONS	288
MULTIPLYING AND DIVIDING	
FRACTIONS	296
REVIEW	303
READING DECIMALS	311
ADDING AND SUBTRACTING	
DECIMALS	318
MULTIPLYING DECIMALS	330
DIVIDING DECIMALS	345
REVIEW	364

CONTENTS

Chapter IV

BILLS AND RECEIPTS	369
CHECKS	373
WHOLE NUMBERS, FRACTIONS, AND DECIMALS	375
HARDER WORK IN DECIMALS	389
PERCENTAGE	396
PROBLEM SOLVING	426
APPLICATIONS OF PERCENTAGE	431
REVIEW	445
GRAPHS	450
MEASURES	459
REVIEW	489



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.	4	2.	3	3.	6	4.	9	5.	5	6.	9	7.	9	8.	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
	<u>3</u>		<u>0</u>		<u>2</u>		<u>2</u>		<u>8</u>		<u>7</u>		<u>7</u>		<u>3</u>

9.	9	10.	8	11.	5	12.	7	13.	5	14.	4	15.	3	16.	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
	<u>3</u>		<u>8</u>		<u>8</u>		<u>9</u>		<u>9</u>		<u>7</u>		<u>9</u>		<u>6</u>

17.	6	18.	5	19.	4	20.	8	21.	9	22.	4	23.	7	24.	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
	<u>6</u>		<u>3</u>		<u>9</u>		<u>6</u>		<u>5</u>		<u>6</u>		<u>5</u>		<u>1</u>

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

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

DRILL IN ADDITION

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

1.	8	2.	7	3.	9	4.	3	5.	4	6.	3	7.	8	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
	<u>5</u>		<u>3</u>		<u>8</u>		<u>5</u>		<u>2</u>		<u>0</u>		<u>4</u>		<u>7</u>

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

9.	89	10.	19	11.	83	12.	31	13.	70	14.	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
	<u>53</u>		<u>32</u>		<u>68</u>		<u>34</u>		<u>19</u>		<u>57</u>

15.	99	16.	97	17.	27	18.	92	19.	24	20.	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
	<u>47</u>		<u>21</u>		<u>92</u>		<u>10</u>		<u>59</u>		<u>98</u>

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

COLUMN ADDITION

Add the following and check the work:

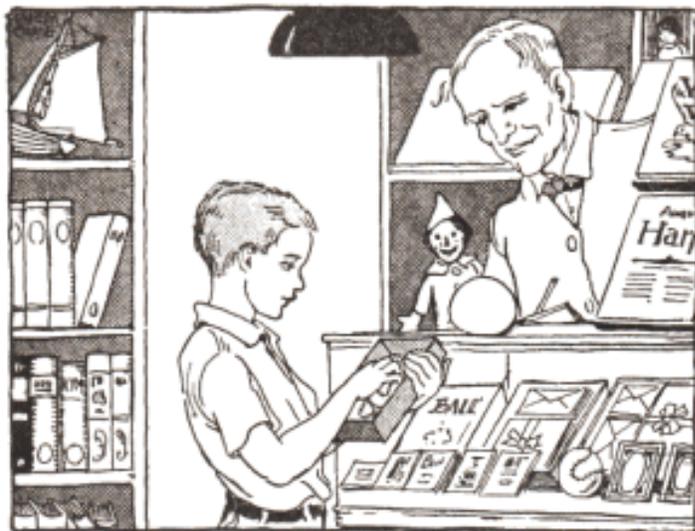
1. 294	2. 470	3. 522	4. 226	5. 822	6. 829
841	133	937	590	584	606
598	658	731	616	364	145
430	472	630	360	731	878
122	319	819	658	875	910
<u>373</u>	<u>470</u>	<u>259</u>	<u>789</u>	<u>569</u>	<u>710</u>

7. 505	8. 524	9. 873	10. 198	11. 953	12. 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
<u>677</u>	<u>944</u>	<u>261</u>	<u>709</u>	<u>616</u>	<u>257</u>

13. 841	14. 924	15. 719	16. 610	17. 322	18. 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
<u>685</u>	<u>798</u>	<u>598</u>	<u>855</u>	<u>658</u>	<u>154</u>

19. 603	20. 722	21. 716	22. 473	23. 820	24. 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
<u>986</u>	<u>686</u>	<u>214</u>	<u>809</u>	<u>696</u>	<u>727</u>

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 ex-

penses 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
	<u>85.78</u>		<u>68.47</u>		<u>51.90</u>		<u>65.58</u>

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
	<u>47.89</u>		<u>42.39</u>		<u>30.95</u>		<u>74.80</u>

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
	<u>25.68</u>		<u>26.00</u>		<u>189.16</u>		<u>89.59</u>

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
<u> .14</u>	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?

\$4.20	
<u> 2.57</u>	
\$1.63	Difference

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

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:

$$\begin{array}{r} 1. \ 2967 \\ \underline{\ 585} \end{array}$$

$$\begin{array}{r} 2. \ 6384 \\ \underline{\ 747} \end{array}$$

$$\begin{array}{r} 3. \ 7475 \\ \underline{3994} \end{array}$$

$$\begin{array}{r} 4. \ 6354 \\ \underline{5549} \end{array}$$

$$\begin{array}{r} 5. \ 7253 \\ \underline{\ 324} \end{array}$$

$$\begin{array}{r} 6. \ 8252 \\ \underline{\ 482} \end{array}$$

$$\begin{array}{r} 7. \ 9629 \\ \underline{7656} \end{array}$$

$$\begin{array}{r} 8. \ 9215 \\ \underline{2631} \end{array}$$

$$\begin{array}{r} 9. \ 4850 \\ \underline{\ 170} \end{array}$$

$$\begin{array}{r} 10. \ 4126 \\ \underline{\ 881} \end{array}$$

$$\begin{array}{r} 11. \ 5001 \\ \underline{3331} \end{array}$$

$$\begin{array}{r} 12. \ 7009 \\ \underline{5247} \end{array}$$

$$\begin{array}{r} 13. \ 5647 \\ \underline{\ 388} \end{array}$$

$$\begin{array}{r} 14. \ 8446 \\ \underline{3666} \end{array}$$

$$\begin{array}{r} 15. \ 7275 \\ \underline{2299} \end{array}$$

$$\begin{array}{r} 16. \ 8910 \\ \underline{1429} \end{array}$$

$$\begin{array}{r} 17. \ 8913 \\ \underline{\ 972} \end{array}$$

$$\begin{array}{r} 18. \ 3263 \\ \underline{1871} \end{array}$$

$$\begin{array}{r} 19. \ 8526 \\ \underline{7894} \end{array}$$

$$\begin{array}{r} 20. \ 5419 \\ \underline{2888} \end{array}$$

$$\begin{array}{r} 21. \ 4301 \\ \underline{\ 750} \end{array}$$

$$\begin{array}{r} 22. \ 5800 \\ \underline{2611} \end{array}$$

$$\begin{array}{r} 23. \ 8000 \\ \underline{2546} \end{array}$$

$$\begin{array}{r} 24. \ 7912 \\ \underline{4886} \end{array}$$

$$\begin{array}{r} 25. \ 9094 \\ \underline{\ 765} \end{array}$$

$$\begin{array}{r} 26. \ 9319 \\ \underline{3650} \end{array}$$

$$\begin{array}{r} 27. \ 4314 \\ \underline{3491} \end{array}$$

$$\begin{array}{r} 28. \ 3209 \\ \underline{1669} \end{array}$$

PRACTICE IN SUBTRACTION

Subtract the following and check the work:

$$\begin{array}{r} 1. \ \$77.64 \\ \quad 47.87 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \ \$80.00 \\ \quad 19.05 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \ \$50.00 \\ \quad 23.83 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \ \$76.32 \\ \quad 57.75 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \ \$70.04 \\ \quad 35.66 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \ \$82.43 \\ \quad 44.87 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \ \$66.34 \\ \quad 19.48 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \ \$51.33 \\ \quad 14.36 \\ \hline \end{array}$$

$$\begin{array}{r} 9. \ \$73.41 \\ \quad 15.40 \\ \hline \end{array}$$

$$\begin{array}{r} 10. \ \$93.64 \\ \quad 29.69 \\ \hline \end{array}$$

$$\begin{array}{r} 11. \ \$82.32 \\ \quad 22.86 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \ \$40.70 \\ \quad 11.02 \\ \hline \end{array}$$

$$\begin{array}{r} 13. \ \$41.78 \\ \quad 9.99 \\ \hline \end{array}$$

$$\begin{array}{r} 14. \ \$32.81 \\ \quad 7.89 \\ \hline \end{array}$$

$$\begin{array}{r} 15. \ \$50.03 \\ \quad 7.63 \\ \hline \end{array}$$

$$\begin{array}{r} 16. \ \$87.44 \\ \quad 8.95 \\ \hline \end{array}$$

Subtract the following and check the work:

$$\begin{array}{r} 17. \ \$361.03 \\ \quad 237.44 \\ \hline \end{array}$$

$$\begin{array}{r} 18. \ \$921.27 \\ \quad 668.89 \\ \hline \end{array}$$

$$\begin{array}{r} 19. \ \$860.00 \\ \quad 141.25 \\ \hline \end{array}$$

$$\begin{array}{r} 20. \ \$796.21 \\ \quad 658.35 \\ \hline \end{array}$$

$$\begin{array}{r} 21. \ \$700.00 \\ \quad 289.72 \\ \hline \end{array}$$

$$\begin{array}{r} 22. \ \$924.34 \\ \quad 438.66 \\ \hline \end{array}$$

$$\begin{array}{r} 23. \ \$534.25 \\ \quad 399.59 \\ \hline \end{array}$$

$$\begin{array}{r} 24. \ \$770.10 \\ \quad 363.06 \\ \hline \end{array}$$

$$\begin{array}{r} 25. \ \$627.48 \\ \quad 78.77 \\ \hline \end{array}$$

$$\begin{array}{r} 26. \ \$392.78 \\ \quad 6.79 \\ \hline \end{array}$$

$$\begin{array}{r} 27. \ \$300.08 \\ \quad 46.48 \\ \hline \end{array}$$

$$\begin{array}{r} 28. \ \$821.65 \\ \quad 8.67 \\ \hline \end{array}$$

$$\begin{array}{r} 29. \ \$554.35 \\ \quad 96.75 \\ \hline \end{array}$$

$$\begin{array}{r} 30. \ \$660.00 \\ \quad 3.51 \\ \hline \end{array}$$

$$\begin{array}{r} 31. \ \$132.87 \\ \quad 89.89 \\ \hline \end{array}$$

$$\begin{array}{r} 32. \ \$473.43 \\ \quad 95.45 \\ \hline \end{array}$$



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

MAKING CHANGE

Mary spent 22¢ for colored paper and 15¢ for paste. If she gave the clerk 50¢, how much change did she get?

This problem has two steps. The first step is to find how much Mary spent in all and the second step is to find how much change she got.

First Step. To find how much Mary spent in all, you add 22¢ and 15¢. This gives 37¢ as the answer to the first step. You use this answer to work the second step of the problem.

$$\begin{array}{r} 22 \\ 15 \\ \hline 37 \end{array}$$

Second Step. To find the amount of Mary's change, you subtract 37¢ from 50¢. This gives 13¢ for the answer to the second step. This is also the answer to the problem. You see that Mary got 13¢ change.

$$\begin{array}{r} 50 \\ 37 \\ \hline 13 \end{array}$$

Work these two-step problems:

1. Robert paid \$.45 for a book and \$.12 for a ruler. How much change did he get from \$1.00?

2. For his lunch to-day Frank bought soup for 7¢, milk for 5¢, a sandwich for 9¢, and ice cream for 10¢. If he paid for his lunch with a half dollar, how much change did he get?

3. To-day Mrs. Case went to the grocery store. She bought 2 doz. oranges at \$.29 a dozen. How much did she have left from \$1.00?

4. Mrs. Wilson sent Ann to the store for $\frac{1}{2}$ lb. of tea. If the tea was \$.70 a pound, how much change did Ann get from a half dollar?

5. Mary's mother bought her a sweater for \$2.50, a dress for \$3.98, and a hat for \$1.19. How much money did she have left from a 10-dollar bill?

TWO-STEP PROBLEMS

1. Jim and Tom went fishing. Jim caught 8 fish and Tom caught 9 fish. They kept 10 fish and gave the rest away. How many fish did they give away?

2. Alice bought 3 yd. of blue ribbon and 5 yd. of pink ribbon. She paid 8¢ a yard for each kind. How much did she pay for all the ribbon?

3. Joe keeps hens. He got 17 eggs yesterday and 26 eggs to-day. If he sold 30 eggs to Mrs. King, how many eggs did he have left?

4. Mary bought $\frac{1}{4}$ lb. of salted nuts at \$.80 a pound and a box of candy for \$.50. How much in all did she pay for these things?

5. Jack had 150 stamps. He gave Bob 25 stamps. Now he has a new stamp book that holds 400 stamps. How many more stamps does he need to fill the book?

6. Mrs. West paid \$.05 for a spool of thread, \$.35 for a dress pattern, and \$1.74 for cloth for a dress. How much change did she get from a 5-dollar bill?

7. John sold 6 qt. of berries at 15¢ a quart. He put $\frac{1}{2}$ of the money he got in his bank. How much money did he put in his bank?

8. Betty earned a quarter running errands. She spent 5¢ for an ice-cream cone and 8¢ for popcorn. How much money did she have left?

9. There were 5 boys and 7 girls who went to Squirrel Pond for a picnic. It cost 12¢ each to go there and back on the bus. How much did all the fares cost?

HOW TO IMPROVE YOUR SKILL IN COMPUTING

You are all anxious to improve your skill in computing. You can do this if you practice faithfully; but you may find that you do not improve very much *unless you practice in the right way*. Suppose that you wish to improve your ability in the standing broad jump. You will improve somewhat if you practice jumping each day; but you will make the fastest progress if you *carefully measure* the longest distance you jump to-day, and write it down, and *then try hard to jump a little farther to-morrow*. Every athlete watches his record carefully in this way and *always tries to improve it*.

If you wish to add as well as or better than any other pupil in your class, you must watch your record and *always try to improve it*.

A good way to do this is by means of Improvement Tests, such as Test 1A in Addition, given on page 17. When you try this test, the teacher will time you, telling you when to start and when to stop. At the end of the 4 minutes allowed for the test, the teacher will read the correct answers and you should see how many examples you have right. Then find your score on the test.

Try the same test again *the next day, doing your best to improve your score*. Repeat the test as often as the teacher directs, trying to get all the problems right, if possible, in 4 minutes.

The teacher will tell you when to try Test 1B. Write down your score each time that you take a test, keeping your record as shown on page 20. See pages 18 and 19.

Always try to improve upon your best previous record.

NOTE. See Suggestions to Teachers on the page before the Index.

IMPROVEMENT TEST No. 1

Test 1 A — Addition (Time 4 min.)

1. 287	2. 791	3. 578	4. 148	5. 284
395	706	845	263	495
906	268	659	587	509
<u>331</u>	<u>519</u>	<u>763</u>	<u>264</u>	<u>787</u>
6. 217	7. 267	8. 149	9. 666	10. 838
143	654	804	397	343
294	495	755	360	529
<u>949</u>	<u>801</u>	<u>803</u>	<u>373</u>	<u>418</u>

Test 1 B — Subtraction (Time 4 min.)

1. 1141	2. 4065	3. 8223	4. 9169	5. 6824
<u>372</u>	<u>530</u>	<u>3284</u>	<u>974</u>	<u>885</u>
6. 1342	7. 2000	8. 7011	9. 9817	10. 3570
<u>786</u>	<u>1262</u>	<u>1043</u>	<u>5919</u>	<u>2856</u>
11. 1688	12. 7863	13. 2009	14. 8493	15. 5492
<u>391</u>	<u>355</u>	<u>460</u>	<u>2909</u>	<u>662</u>

Test 1 C — Addition (Time 4 min.)

1. 128	2. 959	3. 897	4. 698	5. 169
407	257	332	725	370
826	349	806	590	138
532	160	758	844	901
790	741	391	104	749
336	254	217	476	776
901	162	743	835	819
<u>290</u>	<u>908</u>	<u>489</u>	<u>948</u>	<u>346</u>

HOW TO TAKE AN IMPROVEMENT TEST

When you are taking an Improvement Test in addition, subtraction, or short division, like Test 1 A, 1 B, or 3 A, do not copy the examples. Instead, place the edge of a sheet of paper directly under the first row of examples in the test, and write only the answers along that edge of the paper. Then fold these answers under and write the next row of answers along the folded edge.



For an Improvement Test in multiplication or long division, like Test 2 C or 3 C, the examples should be copied on paper before the test begins. In copying, spread the ex-

amples out so as to give sufficient space for working them. The time allowed for the tests in multiplication and long division does not include the time required for copying.

Work on each test only the number of minutes permitted for that test, and stop work *immediately at the end of that time*, even if you are just finishing an example. Otherwise it will not be possible to compare your scores from day to day on the same test.

If you finish a test before the signal to stop, check as many of the examples as you can in the remaining time. Occasionally the teacher will have you check the entire test, allowing you twice as long for doing and checking all the examples as for only doing them once.

FINDING YOUR SCORE IN AN IMPROVEMENT TEST

This table shows how to find your score on a test.

NUMBER OF EXAMPLES IN TEST ↓	NUMBER OF EXAMPLES RIGHT																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
3	0	3	7	10													
4	0	3	5	8	10												
5	0	2	4	6	8	10											
6	0	2	3	5	7	8	10										
8	0	1	3	4	5	6	8	9	10								
9	0	1	2	3	4	6	7	8	9	10							
10	0	1	2	3	4	5	6	7	8	9	10						
12	0	1	2	3	3	4	5	6	7	8	8	9	10				
→ A → 15	0	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10	
16	0	1	1	2	3	3	4	4	5	6	6	7	8	8	9	9	10

1. Suppose that you take Test 1 B, which contains 15 examples, and get 12 examples right. Look down the first column to the *row* beginning with 15 (shown by Arrow A). Look *along that row* until you reach the *column* with 12 at the top (shown by Arrow B), and you will find the number 8 (shown by Arrow C). This means that your score is 8 on that test.

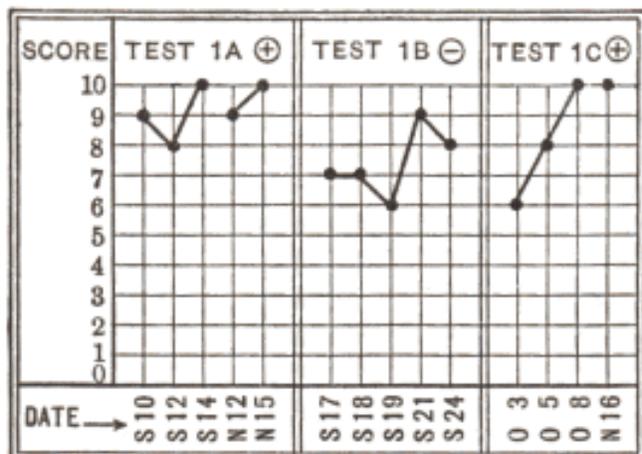
2. In Test 1 A (containing 10 examples), if you get 8 examples right, your score is 8; if you get 10 examples right, your score is 10, or perfect.

3. In finding your score, count only the examples that are entirely right. A partly finished example does not count.

Use the above table to find Frank's scores in these tests:

Number in test	5	8	8	9	10	10	12	12	12	15
Number right	4	5	7	5	7	9	8	10	12	14

GRAPHS OF RECORDS IN IMPROVEMENT TESTS



Here is a picture, or **graph**, of Carl's daily scores. Such a picture is the best way to keep your record.

The dates on which Carl tried each test are given below the bottom line of the graph. S 10

means Sept. 10, which is the first day on which Carl tried Test 1 A. The heavy black dot above S 10, on the horizontal line marked 9, shows that Carl got a score of 9 on Sept. 10. The months are abbreviated as shown at the right.

S = Sept.	F = Feb.
O = Oct.	M = Mar.
N = Nov.	A = Apr.
D = Dec.	My = May
J = Jan.	Ju = June

Reading the Graph of Carl's Record

1. What was Carl's score on Sept. 12? Did he do as well then as on Sept. 10? Did he improve on Sept. 14?
2. How many times did he try Test 1 A before he got a score of 10, or a perfect score?
3. How long after he first got a score of 10 did he try Test 1 A again? What was his score on Nov. 12?
4. Did Carl do as well on Test 1 B as on 1 A? What was his first score on Test 1 B? his lowest score? his last score? Does he need more practice on Test 1 B?
5. Tell his lowest and his highest score on Test 1 C.
6. On which test did Carl improve the most rapidly?

THE 100 MULTIPLICATION COMBINATIONS

Try to multiply all these orally in 2 min. Give the answers only. The last 4 rows are the hardest. Practice on those combinations that you get wrong or do slowly:

1.	<u>1</u>	<u>2</u>	<u>6</u>	<u>9</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>1</u>	<u>6</u>	<u>2</u>
	<u>2</u>	<u>0</u>	<u>2</u>	<u>0</u>	<u>6</u>	<u>1</u>	<u>9</u>	<u>0</u>	<u>0</u>	<u>6</u>
2.	<u>2</u>	<u>6</u>	<u>1</u>	<u>9</u>	<u>0</u>	<u>5</u>	<u>0</u>	<u>2</u>	<u>1</u>	<u>5</u>
	<u>2</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>1</u>	<u>1</u>	<u>3</u>	<u>3</u>	<u>2</u>
3.	<u>5</u>	<u>4</u>	<u>0</u>	<u>3</u>	<u>9</u>	<u>4</u>	<u>8</u>	<u>3</u>	<u>8</u>	<u>4</u>
	<u>0</u>	<u>1</u>	<u>4</u>	<u>5</u>	<u>2</u>	<u>5</u>	<u>2</u>	<u>4</u>	<u>0</u>	<u>2</u>
4.	<u>5</u>	<u>0</u>	<u>1</u>	<u>3</u>	<u>0</u>	<u>5</u>	<u>1</u>	<u>2</u>	<u>0</u>	<u>8</u>
	<u>3</u>	<u>3</u>	<u>5</u>	<u>3</u>	<u>9</u>	<u>4</u>	<u>4</u>	<u>8</u>	<u>6</u>	<u>1</u>
5.	<u>1</u>	<u>2</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>4</u>	<u>5</u>	<u>0</u>	<u>7</u>	<u>0</u>
	<u>6</u>	<u>4</u>	<u>7</u>	<u>5</u>	<u>9</u>	<u>3</u>	<u>5</u>	<u>8</u>	<u>2</u>	<u>7</u>
6.	<u>3</u>	<u>7</u>	<u>3</u>	<u>1</u>	<u>4</u>	<u>2</u>	<u>4</u>	<u>7</u>	<u>3</u>	<u>2</u>
	<u>2</u>	<u>0</u>	<u>1</u>	<u>8</u>	<u>4</u>	<u>7</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>5</u>
7.	<u>4</u>	<u>5</u>	<u>4</u>	<u>5</u>	<u>0</u>	<u>8</u>	<u>6</u>	<u>3</u>	<u>6</u>	<u>7</u>
	<u>8</u>	<u>7</u>	<u>6</u>	<u>8</u>	<u>0</u>	<u>4</u>	<u>6</u>	<u>8</u>	<u>3</u>	<u>5</u>
8.	<u>7</u>	<u>6</u>	<u>7</u>	<u>3</u>	<u>3</u>	<u>9</u>	<u>9</u>	<u>8</u>	<u>6</u>	<u>9</u>
	<u>3</u>	<u>5</u>	<u>7</u>	<u>9</u>	<u>7</u>	<u>3</u>	<u>9</u>	<u>3</u>	<u>4</u>	<u>7</u>
9.	<u>8</u>	<u>4</u>	<u>5</u>	<u>8</u>	<u>9</u>	<u>6</u>	<u>4</u>	<u>8</u>	<u>7</u>	<u>7</u>
	<u>8</u>	<u>9</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>9</u>	<u>7</u>	<u>9</u>	<u>8</u>	<u>4</u>
10.	<u>7</u>	<u>9</u>	<u>6</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>8</u>	<u>9</u>
	<u>6</u>	<u>6</u>	<u>8</u>	<u>9</u>	<u>7</u>	<u>9</u>	<u>7</u>	<u>8</u>	<u>6</u>	<u>5</u>



BUYING THINGS FOR THE SCHOOL STORE

1. At the beginning of the school year, our school store buys 25 fountain pens at \$1.46 each.

How much do the pens cost in all?

You do the work as shown here.

Check the work by going over it.

In this example, \$1.46 and 25 are called the **factors** and the answer is the **product**.

\$1.46	Multiplicand
25	Multiplier
7 30	
29 2	
\$36.50	Product

Find the cost of these things for the school store:

2. 35 geographies at \$1.27 each.
3. 78 arithmetics at \$.72 each.
4. 95 readers at \$.84 each.
5. 62 spelling books at \$.43 each.
6. 50 writing pads at \$.18 each.
7. 12 dozen red pencils at \$.58 a dozen.
8. 18 water-color paint sets at \$.45 each.
9. 24 dozen notebooks at \$1.08 a dozen.

PRACTICE IN MULTIPLICATION

Copy these examples. Then multiply as rapidly as you can. Check each example by going over your work carefully:

1. $\begin{array}{r} 576 \\ 43 \\ \hline \end{array}$	6. $\begin{array}{r} 725 \\ 29 \\ \hline \end{array}$	11. $\begin{array}{r} 918 \\ 82 \\ \hline \end{array}$	16. $\begin{array}{r} 862 \\ 75 \\ \hline \end{array}$	21. $\begin{array}{r} 829 \\ 45 \\ \hline \end{array}$
2. $\begin{array}{r} 275 \\ 86 \\ \hline \end{array}$	7. $\begin{array}{r} 517 \\ 57 \\ \hline \end{array}$	12. $\begin{array}{r} 942 \\ 63 \\ \hline \end{array}$	17. $\begin{array}{r} 316 \\ 59 \\ \hline \end{array}$	22. $\begin{array}{r} 609 \\ 38 \\ \hline \end{array}$
3. $\begin{array}{r} 346 \\ 27 \\ \hline \end{array}$	8. $\begin{array}{r} 316 \\ 38 \\ \hline \end{array}$	13. $\begin{array}{r} 603 \\ 76 \\ \hline \end{array}$	18. $\begin{array}{r} 248 \\ 83 \\ \hline \end{array}$	23. $\begin{array}{r} 347 \\ 56 \\ \hline \end{array}$
4. $\begin{array}{r} 436 \\ 59 \\ \hline \end{array}$	9. $\begin{array}{r} 809 \\ 65 \\ \hline \end{array}$	14. $\begin{array}{r} 754 \\ 28 \\ \hline \end{array}$	19. $\begin{array}{r} 509 \\ 69 \\ \hline \end{array}$	24. $\begin{array}{r} 945 \\ 17 \\ \hline \end{array}$
5. $\begin{array}{r} 489 \\ 91 \\ \hline \end{array}$	10. $\begin{array}{r} 829 \\ 47 \\ \hline \end{array}$	15. $\begin{array}{r} 134 \\ 94 \\ \hline \end{array}$	20. $\begin{array}{r} 476 \\ 34 \\ \hline \end{array}$	25. $\begin{array}{r} 827 \\ 29 \\ \hline \end{array}$

Multiply and check. Be sure to put the decimal point and the dollar sign where they belong in the product:

26. $\begin{array}{r} \$62.51 \\ 39 \\ \hline \end{array}$	30. $\begin{array}{r} \$16.87 \\ 96 \\ \hline \end{array}$	34. $\begin{array}{r} \$12.68 \\ 36 \\ \hline \end{array}$	38. $\begin{array}{r} \$38.53 \\ 73 \\ \hline \end{array}$
27. $\begin{array}{r} \$46.93 \\ 82 \\ \hline \end{array}$	31. $\begin{array}{r} \$49.05 \\ 65 \\ \hline \end{array}$	35. $\begin{array}{r} \$92.05 \\ 19 \\ \hline \end{array}$	39. $\begin{array}{r} \$57.12 \\ 67 \\ \hline \end{array}$
28. $\begin{array}{r} \$49.17 \\ 37 \\ \hline \end{array}$	32. $\begin{array}{r} \$35.28 \\ 48 \\ \hline \end{array}$	36. $\begin{array}{r} \$26.70 \\ 48 \\ \hline \end{array}$	40. $\begin{array}{r} \$30.26 \\ 47 \\ \hline \end{array}$
29. $\begin{array}{r} \$59.24 \\ 69 \\ \hline \end{array}$	33. $\begin{array}{r} \$68.05 \\ 47 \\ \hline \end{array}$	37. $\begin{array}{r} \$70.52 \\ 83 \\ \hline \end{array}$	41. $\begin{array}{r} \$81.07 \\ 76 \\ \hline \end{array}$

ANOTHER WAY TO CHECK MULTIPLICATION

Multiplication can always be checked by going over the work again. Another way to check multiplication is to change the position of the factors and multiply again. This is called *reversing the factors*. If you have found 75×83 , you can check the result by finding 83×75 . The product will be the same both ways if the work is correct.

<i>Example</i>	<i>Check</i>
83	75
75	83
<hr style="width: 50px; margin: 0;"/> 415	<hr style="width: 50px; margin: 0;"/> 225
581	600
<hr style="width: 50px; margin: 0;"/> 6225	<hr style="width: 50px; margin: 0;"/> 6225

Use the method of checking explained above when both factors have the same number of figures. Otherwise check by going over the work again.

Exercises

Multiply. Check the work by reversing the factors:

- | | | | | | |
|--|--|--|--|--|--|
| 1. $\begin{array}{r} 54 \\ 98 \\ \hline \end{array}$ | 2. $\begin{array}{r} 76 \\ 43 \\ \hline \end{array}$ | 3. $\begin{array}{r} 48 \\ 52 \\ \hline \end{array}$ | 4. $\begin{array}{r} 52 \\ 26 \\ \hline \end{array}$ | 5. $\begin{array}{r} 87 \\ 19 \\ \hline \end{array}$ | 6. $\begin{array}{r} 85 \\ 37 \\ \hline \end{array}$ |
|--|--|--|--|--|--|

Multiply. Check by going over the work again:

- | | | | | |
|--|--|--|---|---|
| 7. $\begin{array}{r} 9421 \\ 65 \\ \hline \end{array}$ | 8. $\begin{array}{r} 2843 \\ 74 \\ \hline \end{array}$ | 9. $\begin{array}{r} 3176 \\ 92 \\ \hline \end{array}$ | 10. $\begin{array}{r} 3756 \\ 15 \\ \hline \end{array}$ | 11. $\begin{array}{r} 6382 \\ 68 \\ \hline \end{array}$ |
|--|--|--|---|---|

Multiply the following. Tell which check you will use for each problem, and then check it:

- | | | | | |
|---|---|---|---|---|
| 12. $\begin{array}{r} 197 \\ 86 \\ \hline \end{array}$ | 13. $\begin{array}{r} 496 \\ 7 \\ \hline \end{array}$ | 14. $\begin{array}{r} 209 \\ 89 \\ \hline \end{array}$ | 15. $\begin{array}{r} 623 \\ 83 \\ \hline \end{array}$ | 16. $\begin{array}{r} 5926 \\ 9 \\ \hline \end{array}$ |
| 17. $\begin{array}{r} 731 \\ 217 \\ \hline \end{array}$ | 18. $\begin{array}{r} 459 \\ 342 \\ \hline \end{array}$ | 19. $\begin{array}{r} 492 \\ 571 \\ \hline \end{array}$ | 20. $\begin{array}{r} 376 \\ 356 \\ \hline \end{array}$ | 21. $\begin{array}{r} 806 \\ 684 \\ \hline \end{array}$ |

TAKING CARE OF 0's IN MULTIPLICATION

Unless you watch the 0's in a multiplication example they may cause you trouble. Study these examples carefully so that you will know what to do with the 0's.

$\begin{array}{r} 456 \\ 730 \\ \hline 13680 \\ 3192 \\ \hline 332880 \end{array}$	This 0 stands out at the right.	$\begin{array}{r} 456 \\ 703 \\ \hline 1368 \\ 3192 \\ \hline 320568 \end{array}$	This 2 comes under the 7 of 703.
←		←	
←	This 2 comes under the 7 of 730.		

Exercises

Check these problems the new way shown on page 24.

1. Herman has a news stand at Red Oaks Station. He sells, on an average, 126 papers a day. If he works 350 days in a year, how many papers does he sell in a year?

2. The Westfield School has 409 pupils. The cost of the school is estimated at \$105 a year for each pupil. How much does the school cost in a year?

3. May Jones makes about 108 paper flowers a day. When she works 230 days in a year, how many flowers does she make in a year?

Multiply. Check by reversing the factors:

4. $\begin{array}{r} 683 \\ 740 \\ \hline \end{array}$	7. $\begin{array}{r} 649 \\ 690 \\ \hline \end{array}$	10. $\begin{array}{r} 803 \\ 609 \\ \hline \end{array}$	13. $\begin{array}{r} 579 \\ 408 \\ \hline \end{array}$	16. $\begin{array}{r} 357 \\ 407 \\ \hline \end{array}$
5. $\begin{array}{r} 459 \\ 380 \\ \hline \end{array}$	8. $\begin{array}{r} 503 \\ 260 \\ \hline \end{array}$	11. $\begin{array}{r} 298 \\ 203 \\ \hline \end{array}$	14. $\begin{array}{r} 207 \\ 702 \\ \hline \end{array}$	17. $\begin{array}{r} 245 \\ 208 \\ \hline \end{array}$
6. $\begin{array}{r} 409 \\ 570 \\ \hline \end{array}$	9. $\begin{array}{r} 836 \\ 850 \\ \hline \end{array}$	12. $\begin{array}{r} 457 \\ 503 \\ \hline \end{array}$	15. $\begin{array}{r} 506 \\ 708 \\ \hline \end{array}$	18. $\begin{array}{r} 653 \\ 309 \\ \hline \end{array}$

SAVING TIME IN MULTIPLICATION

The owner of a radio shop is finding how much 132 storage batteries will cost him at \$9 each.

He must multiply \$9 by 132. This could be done as shown in *A*, but it is much easier to multiply as shown in *B*. Notice that 9×132 gives the same product as 132×9 , just as 5×7 equals 7×5 .

When you do the work as shown in *B*, remember that the result, 1188, stands for *dollars* because you are finding the cost.

<i>A</i>	<i>B</i>
9	132
132	9
<hr style="width: 100%;"/>	<hr style="width: 100%;"/>
18	1188
27	
9	
<hr style="width: 100%;"/>	
1188	

If one factor has fewer figures than the other, it is always quicker to multiply by the factor with the fewer figures.

Exercises

Multiply the quicker way. Then decide if the answer stands for dollars, yards, or some other unit.

1. Find the cost of 48 hats at \$5 each.
2. There are 304 girls in the Fitch School. Each girl needs 2 yd. of light blue paper for a parade costume. How many yards of light blue paper are needed?
3. Richard sells magazines at 15¢ each. How much will he collect for 185 magazines?
4. David has 14 chickens. A poultry farm has 258 times as many. How many chickens has the poultry farm?

Have a race with a boy or a girl in your class to see who can do these examples more quickly:

- | | | |
|-----------------------|----------------------|----------------------|
| 5. 186×4 hr. | 8. $182 \times \$2$ | 11. $432 \times 3¢$ |
| 6. 901×7 ft. | 9. $156 \times \$5$ | 12. $287 \times 4¢$ |
| 7. 165×9 yd. | 10. $307 \times \$8$ | 13. $129 \times 11¢$ |

MRS. FISKE'S CANDY SHOP

1. Mrs. Fiske has a candy store near our school. One day she made 48 boxes of nut fudge, which she sold at 19¢ a box. How much did she get for the fudge?

2. The same day she made 104 bars of molasses taffy for which she charged 5¢ a bar. If she sold all the taffy, how much did she receive for it?



3. Mrs. Fiske used 65 lb. of sugar for candy last week and 52 lb. this week. How many pounds of sugar did she use in the two weeks?

4. To-day Mrs. Fiske took in \$14.56 and last Saturday she took in \$38.69. How much more did she take in on Saturday than she did to-day?

★5. At Easter she bought from a candy factory 36 one-pound boxes of chocolates at \$.78 a box and 27 two-pound boxes at \$1.39 a box. What was her total bill?

6. Bert bought a box of small mints from Mrs. Fiske. He counted 210 mints in the box. How many mints would there be in 35 of these boxes? in 50 boxes? in 100 boxes? in 125 boxes?

7. Mary bought a box of candy for \$.25 and some salted peanuts for \$.19. She gave Mrs. Fiske a half dollar. How much change did Mary get?

THE 90 DIVISION COMBINATIONS

Try to divide all the following orally in 2 min. Give the answers only. Practice on those combinations that you get wrong or do slowly:

- | | | | | | | |
|-----|-------------------|--------------------|--------------------|--------------------|--------------------|-------------------|
| 1. | $2)\underline{4}$ | $4)\underline{28}$ | $7)\underline{49}$ | $8)\underline{64}$ | $9)\underline{0}$ | $1)\underline{5}$ |
| 2. | $1)\underline{6}$ | $3)\underline{27}$ | $7)\underline{28}$ | $5)\underline{15}$ | $2)\underline{6}$ | $5)\underline{0}$ |
| 3. | $4)\underline{4}$ | $3)\underline{12}$ | $6)\underline{18}$ | $2)\underline{12}$ | $8)\underline{48}$ | $3)\underline{6}$ |
| 4. | $4)\underline{0}$ | $9)\underline{36}$ | $4)\underline{16}$ | $5)\underline{30}$ | $7)\underline{14}$ | $1)\underline{9}$ |
| 5. | $3)\underline{3}$ | $4)\underline{20}$ | $8)\underline{16}$ | $2)\underline{18}$ | $5)\underline{45}$ | $2)\underline{2}$ |
| 6. | $9)\underline{9}$ | $6)\underline{24}$ | $6)\underline{42}$ | $5)\underline{20}$ | $3)\underline{18}$ | $4)\underline{8}$ |
| 7. | $1)\underline{3}$ | $4)\underline{24}$ | $4)\underline{36}$ | $3)\underline{21}$ | $5)\underline{35}$ | $8)\underline{0}$ |
| 8. | $3)\underline{9}$ | $6)\underline{30}$ | $2)\underline{16}$ | $7)\underline{63}$ | $5)\underline{25}$ | $1)\underline{2}$ |
| 9. | $1)\underline{7}$ | $7)\underline{35}$ | $7)\underline{56}$ | $6)\underline{12}$ | $8)\underline{24}$ | $5)\underline{5}$ |
| 10. | $7)\underline{0}$ | $9)\underline{27}$ | $3)\underline{24}$ | $7)\underline{42}$ | $9)\underline{18}$ | $3)\underline{0}$ |
| 11. | $1)\underline{4}$ | $7)\underline{21}$ | $3)\underline{15}$ | $9)\underline{54}$ | $2)\underline{14}$ | $1)\underline{8}$ |
| 12. | $8)\underline{8}$ | $5)\underline{10}$ | $8)\underline{40}$ | $9)\underline{72}$ | $9)\underline{63}$ | $2)\underline{0}$ |
| 13. | $6)\underline{0}$ | $6)\underline{48}$ | $8)\underline{32}$ | $9)\underline{81}$ | $4)\underline{12}$ | $1)\underline{1}$ |
| 14. | $7)\underline{7}$ | $8)\underline{56}$ | $2)\underline{10}$ | $8)\underline{72}$ | $6)\underline{54}$ | $2)\underline{8}$ |
| 15. | $1)\underline{0}$ | $9)\underline{45}$ | $5)\underline{40}$ | $6)\underline{36}$ | $4)\underline{32}$ | $6)\underline{6}$ |

GETTING READY FOR SHORT DIVISION

The uneven division combinations below are used over and over again in short division. If you can give the answers to 3 rows of these combinations in 1 minute, you should have no trouble with short division.

Give the quotients and remainders orally:

For example, in $5\overline{)37}$, say "7 and 2 over."

- | | | | | | | |
|-----|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 1. | $6\overline{)7}$ | $5\overline{)37}$ | $6\overline{)29}$ | $5\overline{)19}$ | $6\overline{)57}$ | $5\overline{)17}$ |
| 2. | $5\overline{)4}$ | $3\overline{)23}$ | $3\overline{)17}$ | $4\overline{)14}$ | $6\overline{)38}$ | $4\overline{)37}$ |
| 3. | $3\overline{)8}$ | $5\overline{)48}$ | $5\overline{)23}$ | $3\overline{)20}$ | $3\overline{)29}$ | $6\overline{)19}$ |
| 4. | $4\overline{)1}$ | $6\overline{)47}$ | $4\overline{)17}$ | $6\overline{)11}$ | $5\overline{)31}$ | $6\overline{)40}$ |
| 5. | $4\overline{)7}$ | $4\overline{)35}$ | $6\overline{)27}$ | $6\overline{)22}$ | $4\overline{)30}$ | $5\overline{)13}$ |
| 6. | $6\overline{)3}$ | $4\overline{)39}$ | $6\overline{)13}$ | $2\overline{)19}$ | $3\overline{)14}$ | $2\overline{)13}$ |
| 7. | $3\overline{)5}$ | $5\overline{)36}$ | $4\overline{)11}$ | $6\overline{)58}$ | $5\overline{)34}$ | $6\overline{)53}$ |
| 8. | $4\overline{)2}$ | $6\overline{)43}$ | $4\overline{)27}$ | $4\overline{)25}$ | $4\overline{)19}$ | $3\overline{)25}$ |
| 9. | $5\overline{)9}$ | $6\overline{)34}$ | $6\overline{)59}$ | $3\overline{)22}$ | $5\overline{)42}$ | $6\overline{)55}$ |
| 10. | $4\overline{)9}$ | $6\overline{)25}$ | $5\overline{)24}$ | $6\overline{)51}$ | $5\overline{)26}$ | $5\overline{)38}$ |
| 11. | $2\overline{)7}$ | $6\overline{)17}$ | $6\overline{)41}$ | $4\overline{)33}$ | $4\overline{)22}$ | $6\overline{)15}$ |
| 12. | $7\overline{)9}$ | $5\overline{)12}$ | $5\overline{)29}$ | $3\overline{)10}$ | $5\overline{)44}$ | $6\overline{)45}$ |

UNEVEN DIVISION COMBINATIONS

Here are some harder uneven division combinations. Give the quotients and remainders orally:

1. $7 \overline{)53}$ $9 \overline{)77}$ $8 \overline{)58}$ $8 \overline{)74}$ $8 \overline{)51}$ $8 \overline{)27}$

2. $9 \overline{)14}$ $7 \overline{)34}$ $9 \overline{)17}$ $9 \overline{)57}$ $9 \overline{)46}$ $9 \overline{)59}$

3. $8 \overline{)79}$ $9 \overline{)33}$ $9 \overline{)28}$ $8 \overline{)60}$ $8 \overline{)23}$ $7 \overline{)17}$

4. $7 \overline{)41}$ $8 \overline{)30}$ $8 \overline{)65}$ $9 \overline{)31}$ $9 \overline{)84}$ $7 \overline{)26}$

5. $9 \overline{)67}$ $7 \overline{)57}$ $7 \overline{)29}$ $7 \overline{)38}$ $9 \overline{)69}$ $9 \overline{)40}$

6. $7 \overline{)20}$ $9 \overline{)80}$ $8 \overline{)11}$ $9 \overline{)61}$ $8 \overline{)54}$ $8 \overline{)39}$

Short Division

Find the quotients. Check the work by multiplying the quotient by the divisor:

1. $2 \overline{)48}$ $6 \overline{)60}$ $3 \overline{)963}$ $2 \overline{)806}$ $4 \overline{)840}$

2. $2 \overline{)86}$ $2 \overline{)62}$ $5 \overline{)550}$ $3 \overline{)663}$ $3 \overline{)906}$

3. $3 \overline{)84}$ $6 \overline{)72}$ $2 \overline{)136}$ $7 \overline{)735}$ $9 \overline{)954}$

4. $4 \overline{)60}$ $8 \overline{)96}$ $5 \overline{)315}$ $7 \overline{)504}$ $6 \overline{)288}$

5. $7 \overline{)84}$ $4 \overline{)96}$ $8 \overline{)960}$ $9 \overline{)927}$ $6 \overline{)636}$

6. $5 \overline{)75}$ $7 \overline{)91}$ $5 \overline{)475}$ $8 \overline{)656}$ $7 \overline{)665}$

7. $4 \overline{)72}$ $5 \overline{)80}$ $9 \overline{)792}$ $7 \overline{)756}$ $9 \overline{)918}$

BUYING REMNANTS

1. Janet bought a remnant containing 4 yards of green silk for \$3.93. How much did she pay per yard?

Divide \$3.93 by 4.
The answer is \$.98, with
a remainder of \$.01.

Hence Janet paid a
little over \$.98 a yard.

To check, multiply

the quotient, \$.98, by the divisor, 4, and add the remainder,
\$.01. Since the result, \$3.93, equals the dividend, the work is right.

Divisor	4)	<u>\$3.93</u>	Dividend	<i>Check</i>
		\$.98	Quotient	\$.98
		\$.01	Remainder	4
				\$3.92
				.01
				\$3.93

To check division, multiply the quotient by the divisor and add the remainder. The result should equal the dividend.

2. Albert buys felt to make school banners. How much does he pay per yard if he gets a 7-yard piece for \$18.55? if he gets a 3-yard piece for \$7.50?

3. If a 9-yard remnant costs \$18.27, what is the cost per yard?

4. If a 3-yard remnant costs \$5.70, what is the cost per yard?

Other Problems

1. Six boys bought a football for \$2.94. How much did each pay if they shared the expense equally?

★2. Rose made a train trip of 290 mi. in 9 hr. The train traveled a little over how many miles an hour?

3. Mrs. Allen's 8 grandchildren are saving money to buy her a rocking chair costing \$32.40. How much will each need to save if they divide the cost equally?

4. The 226 girls of the Park School plan to march in rows of 7's in a parade. How many rows will they make? Will any girls be left over?

PRACTICE IN SHORT DIVISION

Divide the following. Check the work by multiplying:

- | | | | | | |
|----|---------------------|---------------------|----------------------|----------------------|----------------------|
| 1. | $2 \overline{)108}$ | $6 \overline{)854}$ | $2 \overline{)1342}$ | $9 \overline{)9540}$ | $5 \overline{)5350}$ |
| 2. | $4 \overline{)252}$ | $8 \overline{)316}$ | $8 \overline{)2165}$ | $4 \overline{)1360}$ | $4 \overline{)3043}$ |
| 3. | $3 \overline{)216}$ | $9 \overline{)367}$ | $7 \overline{)1449}$ | $5 \overline{)1047}$ | $2 \overline{)1186}$ |
| 4. | $8 \overline{)544}$ | $4 \overline{)239}$ | $3 \overline{)2550}$ | $5 \overline{)2532}$ | $6 \overline{)3606}$ |
| 5. | $5 \overline{)525}$ | $2 \overline{)578}$ | $7 \overline{)4335}$ | $8 \overline{)2528}$ | $5 \overline{)3745}$ |
| 6. | $6 \overline{)504}$ | $3 \overline{)494}$ | $8 \overline{)8064}$ | $6 \overline{)6036}$ | $9 \overline{)3672}$ |
| 7. | $9 \overline{)540}$ | $5 \overline{)348}$ | $6 \overline{)2430}$ | $7 \overline{)3049}$ | $6 \overline{)6001}$ |
| 8. | $7 \overline{)525}$ | $8 \overline{)438}$ | $9 \overline{)2133}$ | $3 \overline{)1251}$ | $2 \overline{)1750}$ |
| 9. | $4 \overline{)115}$ | $9 \overline{)981}$ | $5 \overline{)5150}$ | $5 \overline{)4045}$ | $3 \overline{)1874}$ |

In these division examples the answers are given. Tell which answers are wrong and correct them:

- | | | | | | |
|-----|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| 10. | $7 \overline{)483}$
69 | $9 \overline{)4716}$
524 | $6 \overline{)4938}$
823 | $9 \overline{)1845}$
25 | $2 \overline{)1116}$
558 |
| 11. | $3 \overline{)927}$
308 | $6 \overline{)1242}$
207 | $8 \overline{)4344}$
543 | $2 \overline{)1810}$
905 | $6 \overline{)2502}$
418 |
| 12. | $4 \overline{)188}$
47 | $5 \overline{)2185}$
439 | $9 \overline{)1413}$
147 | $5 \overline{)2140}$
428 | $3 \overline{)2811}$
937 |
| 13. | $8 \overline{)856}$
17 | $4 \overline{)3608}$
902 | $7 \overline{)7490}$
107 | $7 \overline{)1456}$
208 | $9 \overline{)1089}$
121 |

IMPROVEMENT TEST No. 2

Test 2 A — Addition (Time 4 min.)

1. 5267	2. 3746	3. 1479	4. 1796	5. 6692
2090	9604	5610	7360	8787
4128	5534	3562	3918	9943
6896	8175	8884	9583	5019
7137	4955	4469	5377	2671
<u>8502</u>	<u>2002</u>	<u>7335</u>	<u>2768</u>	<u>5936</u>

Test 2 B — Subtraction (Time 4 min.)

1. 4910	2. 9571	3. 7412	4. 6075	5. 6635
<u>1340</u>	<u>5681</u>	<u>2543</u>	<u>4172</u>	<u>4539</u>
6. 6375	7. 9300	8. 8243	9. 5517	10. 9822
<u>1777</u>	<u>4587</u>	<u>4696</u>	<u>2980</u>	<u>6942</u>
11. 7501	12. 4000	13. 8423	14. 3168	15. 9349
<u>6340</u>	<u>1527</u>	<u>3182</u>	<u>2898</u>	<u>3187</u>

Test 2 C — Multiplication (Time 5 min. after copying)

1. 765	2. 915	3. 508	4. 790
<u>35</u>	<u>46</u>	<u>72</u>	<u>83</u>
5. 948	6. 826	7. 467	8. 975
<u>65</u>	<u>94</u>	<u>27</u>	<u>49</u>

Test 2 D — Multiplication (Time 4 min. after copying)

1. 975	2. 769	3. 716	4. 543	5. 674
<u>805</u>	<u>314</u>	<u>195</u>	<u>792</u>	<u>806</u>

NOTE. For directions for taking the above tests, see page 18.