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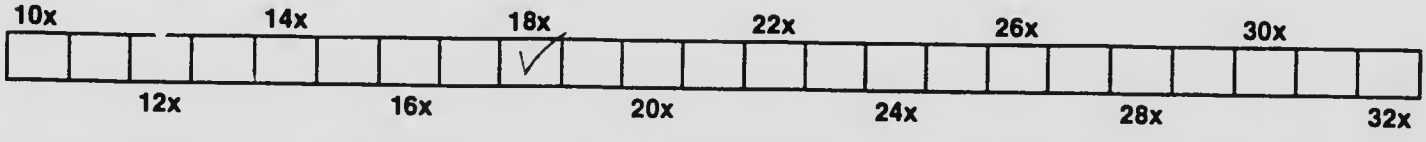

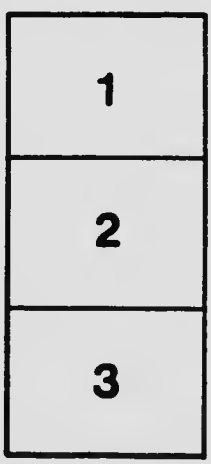

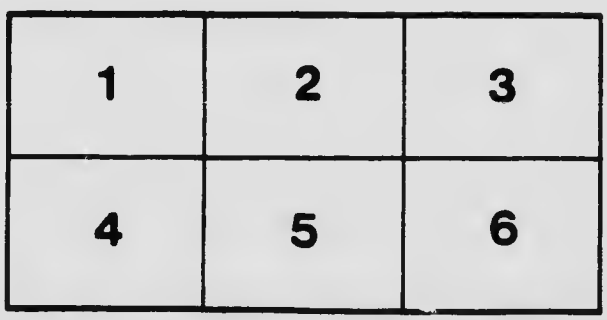

Norman Russell

Sarnia Ont

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"SCHOOL HELPS" SERIES.

ARITHMETIC EXERCISES

FOR FIRST BOOK CLASSES.

BY

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AND

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PREFACE.

The following exercises are intended to furnish primary teachers with a simple, practical and intelligible method of presenting number to little children.

As Arithmetic is taught not only for its practical utility, but also as a means of mental discipline, it follows that in order to develop thought and awaken interest, the teacher must present the subject with an orderliness of arrangement and a unity of purpose in order to secure clear, definite conceptions on the part of the pupil, and enable him to make rapid and thorough progress.

The plan laid down in the following pages has been tested and found to work satisfactorily. It should be the practice of the teacher to make first the process clear, then to secure skill and quickness in its working. If the process be not clear the working will not be intelligent.

The methods of teaching number presented are not mere theories; all of them have been tested by actual experience in the school-room, and it is therefore to be hoped that this little book may be of value and benefit to many young teachers entering the profession.

THE AUTHORS.

Arithmetic for First Book Classes

NOTATION.

The teaching of notation to very young children requires much care and skill. In it is involved the difficult transition from the concrete to the abstract. The first lessons in number should be given by means of sensible objects. When a child enters the primary room from the kindergarten, he has acquired (by experience in stick-laying, peas-work, mat-weaving, the separating and uniting of cube, etc.) a degree of mental power by the use of his inventive and constructive faculties: he has obtained ideas not only of form, but of number. His *first* formal lesson in arithmetic should be an interesting one. Children's numerical ideas are often vague and indefinite Use objects, then, and these number exercises will give the pupils distinct ideas of arithmetical quantities.

Arithmetical language is the method by which we express numbers. It is both *oral* and *written*. The former is called *numeration*, the latter *notation*. The *oral* language of arithmetic (numeration) is taught in connection with the development of the *idea* of number. The *word* and the *word* are so intimately related that the former leads immediately to the latter. As soon as the name of the number is learned the child is taught to express that number in a written character. Written language of the numbers is notation.

Lesson I.

A. Distribute slats (one to each child. Let children "pretend" to go asleep). At the call "*Awake*" all at once are interested.

T. Who came to see you when sleeping?
P. A slat, a stick.
T. Hold slat in right hand.
T. How many slats have you in the right hand?
P. One slat.
T. Place on the table *one* bean, *one* pebble, *one* slate, *one* book, &c. Show me *one* finger, *one* cube, *one* marble, (object being to accumulate instances).

Teacher then places figure (1) on the blackboard, the written character representing the idea. Children make it on their slates. Tell them that it represents *one stick*, *one* slat, *one* flag, *one* top, *one* marble, &c. Impress upon them the fact that "1" always means *one* something, so that they will recognize the written symbol for *one*.

N.B.—*Form* of figures might be made interesting by comparing them to different objects. 1 stands straight like a good soldier.

2.

As before, give another slat to each child.
Hold *first* slat in *right* hand.
How many in right hand? One.
Hold *second* slat in left hand.
How many in left? One.
Transfer left hand slat to right hand.
How many ones in right hand. Two *ones*.

We call the two *ones* by the name TWO. Show the form "2" (like a little duck in the water).

Let the children make the FIGURE on their slates.

Make them understand that figure "2" stands for *two* somethings. Exercise the class in picking out *two* beans, *two* marbles, &c.

How many *ones* in two?
Take away one, how many left?
How many arms has a man?
How many ears has a boy?
How many eyes has a girl?

Numbers *three* to *five*.
Proceed in a similar way.

Testing Exercises.

1. Place groups on the table.

0. 00. 000. 0000. 00000.

a. Let the teacher name them in order.
Pupils give the number of the group.

b. Let the teacher point to them irregularly, each group to be named by class individually or collectively.

c. Allow children to place groups on the desk as directed—other children decide whether right or not.

d. Distribute objects, such as beans, peas, &c. Teacher places figure—e.g. (5). Children make group corresponding.

e. Place the group (5) into as many smaller groups as possible. Children led to think of *five* as five *ones*, *three* and *two*, *four* and *one*, &c.

f. Arrange your *five* group in *ones*.
(1) How many ones? *Five.*
(2) Take away middle one. How many left? Four. *Two twos.*
(3) Make *three* groups, using the five peas, beans, &c.
2, 2, 1, 1, 3, 1, &c.

This can be made a very interesting exercise.

In this way teach the numbers up to *nine* (9).

Drill pupils in reading and writing numbers to "9," until they are entirely familiar with them.

BUSY WORK.

It is important that from the first children should be trained to make correct forms of the figures. Perfect figure formation is just as necessary as perfect letter formation. It is very difficult for little ones to make some of the figures properly, as many children have a tendency to reverse the forms of some—2, 3, 4, 5, 6, 7, 8, 9. To obviate this a little story connecting the form of the figure with some object children have seen will fix the impression better—e.g.:

6—An umbrella handle. Curve must be to the right, because we want to hold the umbrella in the right hand.

3—Have children make two apples—

Tom takes a big bite out of his—

Nell takes a big bite out of hers—

This is how the apple looks—3.

4—L is a chair with perforated seat. Roy put a darning needle through one of the holes.

This is the chair L.

This is the knitting needle l.

The chair with the knitting needle looks like this *4*, figure *4*.

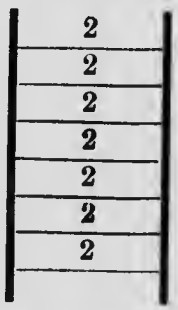
8—Snake, the head, of course at the top, but to the right, thus—S. 8, e.g., 8, twisted, coiling shape of body shown—8.

These illustrations are only suggestive. Every teacher will have certain devices of her own. See that every child learns the correct formation of the figures at this stage. This will save a great deal of trouble afterwards.

1. Make a row of 1's standing like soldiers. Let them stand in the school yard :

1 1 1 1 1 1 1 1 1 1 1 1 1

2. Make a row of 2's climbing a ladder :



For variety, let them be little ducks in the water. They must be perfect ducks if they want to swim well.

3. Make a row of 5's going up the hill. They look like fat little boys holding Jubilee flags. Let the children make the hill. Make four "5's" going *up* the hill, and *three* "5's" running down.

4. Place groups irregularly, e.g., people looking at the Jubilee procession:

111 11111 1111111 11 111111 1 1111 111111111 11111111
3 5 7 2 6 1 4 9 8

Let the children place number in group underneath.

Teaching of Ten.

Review the numbers *one* to *nine*. Distribute *ten* slats to each child. Let the children pick up slats till the *tenth* is reached.

T. Hold *nine* slats in the left hand.

T. Hold *new* slat in the right hand.

Transfer the right hand slat to the left one. How many altogether? Give the new name **ten**. Let them show the *ten* slats and name them.

Pick out *ten* beans, ten marbles, &c.

T. Now, we are going to play a game, and the rule of the game is that when we get *ten* slats we must tie them up in a bundle; if not, we are out, and cannot play.

(Distribute rubber bands, bits of string. Let children make the bundles.)

T. Hold bundle in *left* hand.

T. How many bundles have you? One.

T. How many slats in a bundle? Ten.

T. We call it a *ten* bundle.

Next write symbol for ten on black-board. Children see that it means *ten*—something as before. Test as before. To designate the **ten** and its position use colored chalk—thus, 10; or make the *one* indicating the *ten* in heavy line, and the cipher 0 in a lighter way.

Another interesting way: Make a two-roomed house call the right hand room the units, and the left hand room the tens. The children have the *bundle* in the *left* hand and *no* slats in the *right*, so that they will easily see where to put the tens and the units. They have *one* bundle

in the *left* hand, so we place "1" in the *left* hand room, *no* slats in the right hand so we place "0" in the *right* hand room.

We will put our little bundles in the second room, called the *tens* room, all the single slats in the *first* room (units).

T. When we tied our ten slats in a bundle, had we any left? No.

Pupils are led to see that since one *ten* is expressed by a "1" in the *second* place we need a character to express *no ones* in the first place. We tell them that we use the 0, nought, for this purpose; thus, *ten* is represented by 10, which is *one* ten and *no* ones.

This method is rational and practical, showing the principle of place value. Children have no trouble in understanding it.

Teaching of "11."

Teacher distributes slats as before.

T. Take *bundle* in left hand.

T. Take one slat in right hand.

Idea is now gained. Let the idea now be represented *one* ten and *one* = *eleven*. Give name.

Place in the house as before.

How many bundles have you? One.

Where do we put our *ten* bundle? Tens' room.

Where do we put our single ones? Units' room, first room.

Let them make the symbol for eleven—11.

See that they understand that the *ten* and the *one* make *eleven*. Name is then fixed to the symbol.

Nos. 11-19.

Numbers 12, 13, &c.—19—taught in a similar manner. Associate the greater value of the ten with its position. Use colored chalk to designate the *ten*. Besides interesting the children it will fix the impression of the symbols more firmly.

20.

As before, on reaching 19, another slat is given Game played as before. When we get *ten* we tie them up in a *bundle*.

Draw the two roomed house, designating the tens' room and also *units' room.*

How many bundles now? Two.
How many in each bundle? Ten.
How many tens have we? Two.
Give name and symbol for the two bundles. Twenty.
Twenty means how many *tens?* Two.
Copy symbol. Place in the house:

20–30.

Process practically the same. Teach to 20, using objects. After that stage there is no further necessity for them, except perhaps for one or two individual pupils.

Teacher may exemplify or else have two children come up: one holds *three* bundles. That means *three* tens—new name—thirty.

T. Who will come up and find:

Let them arrange the numbers in the house in order from *one* to 39, &c.

32	33
34	35
36	37
31	38
	39

When children are familiar with the new names for symbols, 30, 40, 50, &c., up to 90, the connection between them and the numbers from 12 to 20 might be contrasted and explained thus: 3—three.
13—thirteen.
30—thirty.

Let the children see that "*teen*" always means *one* ten, and that the termination "*ty*" means or may mean two tens (20), four tens, as in 40, six tens as in sixty—in short, "ty" signifies many *tens.* Never *one* ten.

The principle of decimal notation is taught when children are able to write *tens* and *units.* They know that a figure in the second place means *tens*, in the first place, *units*, and that *ten units* make, or are equal to, *one* ten.

Pupils should then readily analyze numbers as follows:

25 = *Two* TENS, *five units.*

56 = *Five* TENS, SIX UNITS.

Notation of Hundreds.

Class know thoroughly up to 99.

Another slat is added, making the tenth bundle complete.

Game—again the same; when we get *ten* they are to be tied up in a bundle.

How many bundles? Ten.

How many in each bundle? Ten.

We have then how many? Ten tens.

Tie them up in a bundle—one big bundle. *Ten* little (ten) bundles make ONE big (hundred) bundle. Give *new* name for this ONE bundle—ten tens.

Ten tens make one hundred. Write symbol for new number—100.

Use *colored chalk* to designate the new (third) room needed.

Draw a three-roomed house, designating units, tens, hundreds.

How many big (hundred) bundles? One.

How many little (tens) bundles? None.

How many single ones? None.

Place our new number in the house.

Show the new three-roomed house.

The *hundred* bundles placed in the third room associate its greater value with its position. Children see that it takes *ten* of the little (ten) bundles to make *one* of the big (hundred) bundles Class copy symbol and repeat the name—*one hundred.*

101–110.

Next step equally simple:

Make use of the three-roomed house as before.

One big (hundred) bundle.

One big (hundred) bundle and one slat.

One big (hundred) bundle and two slats.

One big (hundred) bundle and three slats, etc., up to 109.

One big (hundred) bundle, one little (ten bundle)=110.

Teacher may call three children to the front of the class :

One to represent *hundreds*

One to represent *tens.*

One to represent *units.*

The child representing hundreds holds the one big (hundred) bundle in his hand ; the child representing *tens* holds nothing till *110* is to be taught, when he is given one little (ten) bundle ; the child representing units is first given *one* slat—101 is formed.

two slats—102 is formed.

three slats—103 is formed.

four slats—104 is formed, etc.

Children at seats make the number as formed by the children.

And so the process goes on. Next steps equally simple, till 999 is reached.

Ten of the *hundreds* made into another big bundle, called *one thousand,* another room is required, and so on.

Points to be Remembered.

Keep work simple. Let child think for himself.

Drill pupils frequently on reading and writing numbers.

Let them often analyse numbers. e.g., seventy equals seven tens. 320=three hundred—two tens.

Absent bundles, or single ones, expressed by "0"—for example : 420=4 hundreds,
2 tens.

Absence of units expressed by "0."

This method of teaching notation teaches numeration as well, and very young children will read with skill and accuracy very difficult numbers.

Chief value of this method is that it accustoms children to associate increasing values with figures as they proceed to the left.

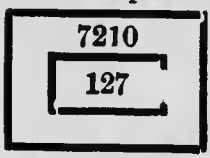
The teaching in reading and writing large numbers should be given gradually. Do not hurry over the subject. Make haste slowly.

Number Games.

1. Make all the numbers you can from a given set of numbers. For example: 1, 2, 3 are given numbers. This is a very good exercise for busy work:

1
2
3
12
13
21
31
23
32
123
132
213
231
312
321

2. From a certain given set of numbers form the largest numbers possible, also the smallest.



The numbers are 1, 2, 7, 0. Place the largest in the large oblong box, the smallest in the small box. This is a good practice, the value of the nought to the right and the left being shown. *Largest 7210*, smallest 127.

3. Let three children come to the front of the room, bringing their slates with them. *Johnny*, representing *hundreds*, takes his position; *Jenny*, representing *tens*, is his next door neighbor; *Willie* represents the *units*.

Teacher, with colored crayon, writes certain numbers on each slate, e.g., 6 on Johnny's, 3 on Jennie's, 4 on Willie's. Children at the seats tell the numbers. (1) Write it in figures on the slates; (2) or write it in words. 634 is the answer. This game is very interesting as a rest after the formal arithmetic lesson.

Devices for Impressing Notation.

A. Teacher holds up a certain number of slats; children represent the number in figures on their slates.

B. Teacher holds up a certain number of slats; children write number in words, e.g., 1 bundle (ten) and two slats; twelve is written.

C. Teacher writes a number on board, e.g. (48); children come up and pick out the number of slats necessary to form that number.

4 (tens) and eight slats.

D. Number building: Make 4, 14, 34, 134, 734, etc.

E. Analyse numbers: Write the number that means 4 hundreds and one ten. 410, etc.

F. Teacher writes a number in words on the board, e.g., four, children write figure corresponding; then fourteen, children write figure as before; then forty, then four hundred, etc.

G. These are only suggestive. Teacher may find many interesting little devices to interest little ones in their work at this stage.

Let them make pictures of Mrs. *Ten's* children: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19. Mrs. Forty's children: 41, 42, 43, 44, etc.

A thorough knowledge of Notation and Numeration will remove the usual difficulties of the fundamental rules.

Numerical Periods.

The pupils should be taught to separate written numbers into periods, and to *name* and remember these *periods.*

Here it will be seen that the law of giving a new name for each higher group of tens is changed to giving a new name for each third group, and that the intermediate names and places are tens and hundreds.

Draw two houses adjoining one another, each having three rooms. When millions are taught make the third house.

Call attention to the neighbors:

Mrs. Units and Mrs. Thousands (Mrs. Million later on). They live next door to each other; each has three little children: Mrs. Units (the baby) Units,

(the tens) of Units,
the hundreds of Units.

Mrs. Thousands (the baby) thousands,
(the tens) of thousands,
the hundreds of thousands.

Refer to children's names, their Christian names and surnames.

In the *units* peroid (house) *units* is the numbers' surname.

In the *thousands* period (house) thousands is the numbers' surname.

Let them build the house, remembering Mrs. Units only has three children, each having his own room; Mrs Thousands only *three* children, each having his own room.

Draw the house as above.

Give numbers: To be read (1) with one period; (2) with two; (3) with three periods (when we have reached that stage).

Let the children *separate* the numbers into periods, always beginning with the units, then *name* the periods, remembering in what order they come. When addition answers are obtained, teach children to mark answers so that they may read them intelligently

Notation.

1. Write in words:

10	100	770
16	110	843
28	119	990
35	230	999
49	348	
80	579	
92	607	

2. Write in words:

1	9	8	1010
10	90	18	2506
100	93	78	4700
1000	903	708	5304
1006	930	718	5540
1060	934	798	8020
1600	9304	7098	9000

3. Write the numbers ending in "0" from 1 to 1000. (1) In figures; (2) in words.

4. Write the numbers ending in "8" from 1 to 200. (1) In figures; (2) in words.

5. Write the numbers ending with "teen" from 1 to 100. (1) In figures; (2) in words.

6. Write all numbers ending in "ty" as far as 100. (1) In figures; (2) in words.

7. Write in figures:

(a) Fifteen.
(b) Ninety.
(c) One hundred.
(d) Two hundred and ten.
(e) Three hundred and nineteen.
(f) Four hundred and seventy.
(g) Eight hundred and eighty-five.
(h) Two thousand.
(i) Three thousand and sixty.

8. Write in figures:

(a) Four thousand.
(b) Four thousand and four.
(c) Fourteen thousand four hundred and forty.
(d) Twenty-seven thousand six hundred and sixteen.
(e) Forty-eight thousand.
(f) One hundred thousand.
(g) One hundred thousand one hundred.
(h) Five hundred and forty thousand six hundred and ninety-nine.
(i) Nine hundred thousand and nine.

9. Write in words :

(1)	(2)	(3)
10000	100000	460006
20603	100100	528080
37450	100210	603902
40800	200348	784815
59627	270625	819096
90090	308099	900070

10. Write in *figures* the number that means :
(a) One ten, and two.
(b) Four tens.
(c) Eight tens and eight.
(d) One hundred and two tens.
(e) Two hundreds no tens and six.
(f) Five hundreds and three tens.
(g) Nine hundreds, nine tens and nine.
(h) Ten hundreds.

11. Write in *words* the numbers that mean :
(a) One thousand and two tens.
(b) Two thousands, three tens and six.
(c) Ten thousands, two tens and four hundred.
(d) Twelve thousand, four hundreds and twelve.
(e) Sixty thousand and two tens
(f) Eighty-five thousand nine hundreds.
(g) Nine hundred thousand and nine tens.
(h) One hundred thousand.

Numeration Exercises.

Read :

(1)	(2)	(3)	(4)	(5)
900	2703	9099	46703	227340
908	4906	9900	50000	305025
996	5504	10000	90204	456073
1000	6720	10016	95000	789674
1007	8009	20070	100000	900002
1017	9905	30850	100006	999999
1710			100600	

ADDITION.

As soon as pupils have the ideas and names of numbers, and can read and write them, they should begin to unite and separate them; that is, perform the processes of addition and subtraction.

Addition and subtraction should be taught simultaneously. Thus, as soon as the child sees that 3 and 2 are 5 he is ready to see that 5 less 2 is 3, or 5 less 3 is 2. Thus, also, in finding the difference between 7 and 3, instead of counting 3 off from 7 to see what remains, he should infer the difference by knowing that 4 and 3 are 7. The synthesis of numbers in obtaining the sum should be accompanied by the analysis of numbers in finding the difference. It is necessary to have some systematic plan of teaching the addition table, and the following has been found to be the most rapid, most intelligent and most readily acquired.

Beginning with the tens—

5	9	1	8	2	6	4	7	3
5	1	9	2	8	4	6	3	7
10	10	10	10	10	10	10	10	10

1. Five and five—1st combination taught.—To begin with this combination enables the child to *apply* this knowledge almost immediately.

Number of Combinations.

In addition there are forty-five combinations to teach. They are as follows:

A. *Tens.*

5+5

1+9
9+1
2+8
8+2
4+6
6+4
3+7
7+3

Those numbers whose sum is *10* or whose sum ending is "*0*," e.g., 14+6=20
27+3=30, &c.

B. *Doubles.*

9+9	sum ending	"	"8"
8+8	"	"	"6"
7+7	"	"	"4"
6+6	"	"	"2"
4+4	"	"	"8"
3+3	"	"	6
2+2	"	"	4
1+1	"	"	2

C. *Nines.*

1+8	or	8+1
3+6		6+3
4+5		5+4
2+7		7+2

Those whose sum is "9" or whose sum ending is *nine.*

D. *Eights.*

4+4 }	have been	1+7	or 7+1
9+9 }	taught.	5+3	3+5
		2+6	6+2

Those whose sum is "8" or whose sum ending is "8."

E. *Sevens.*

1+6	or	6+1
4+3		3+4
2+5		5+2
9+8		8+9

Those whose sum is "7" or whose sum ending is "7."

F. *Sixes.*

3+3 }	have been	1+5	or 5+1
8+8 }	taught.	4+2	2+4
		9+7	7+9

Those whose sum is "6" or whose sum end ing is "6."

G. Fives.

1+4	or	4+1
3+2		2+3
8+7		7+8
9+6		6+9

Those whose sum is "5" or whose sum ending is "5."

H. Fours.

2+2 }	have been	1+3	or 3+1
7+7 }	taught.	9+5	5+9
		8+6	6+8

Those whose sum is "4" or whose sum ending is "4"

I. Threes.	1+2	2+1	
	4+9	9+4	Those whose sum is *three*, or whose sum ending is *three*.
	6+7	7+6	
	8+5	5+8	
J. Twos.	7+5	5+7	
1+1 } have been taught. 6+6 }	3+9	9+3	Those whose sum ending is "2."
	4+8	8+4	
K. Ones.	2+9	9+2	
	4+7	7+4	Those whose sum ending is *one*.
	3+8	8+3	
	5+6	6+5	

Of course, the subtraction table will be the converse of this—

$$10-2=8$$
$$10-5=5$$
$$18-9=9, \text{ \&c.}$$

Addition and subtraction should be taught by means of objects. It is the way in which the pupils really must attain the sums of numbers if they are to understand them. They should be trained to SEE the *sums* before they SAY them.

Do not use objects for a great length of time. Children should be led from concrete to abstract; from *seeing* sums and differences to *thinking* them.

ADDITION.—LESSON I.

N.B.—Ask each child to bring a little cotton bag, into which are placed eighteen (18) pegs (18=9+9, highest combination taught). The pegs are easily handled, and found to be the most advantageous objects in teaching addition.

To teach 5+5=10.

Ask pupils to place their pegs in a little pile at centre or at the bottom of their slates.

T. Place *5* pegs side by side at the top of your slates, e.g.: 1 1 1 1 1— 5

Opposite with slate-pencil place the no. of the group.

T. Now pick out five more pegs. Place these underneath the first group of pegs, e.g.:

1 1 1 1 1— 5
1 1 1 1 1— 5
| | | | | | | | | | —10

B. B. picture.

As before write symbol of second group opposite.

T. How many pegs in 1st group? Pupil—Five.
T. " " " " 2nd " ? " Five.
T. " " " altogether? " Ten.
How many are *five* pegs and five pegs? *Ten* pegs.
" " " " boys " " boys? Ten boys.
&c.

N.B —Subtraction can be taught simultaneously with addition. Incidentally also multiplication and division. For instance, in the above combination, when the sum of 5 and 5 is obtained, the children easily and readily obtain the difference.

T. Take away five, how many left? Five.
1. *Ten* less *five*, how many? Five.
2. How many *fives* do we have to take to make *ten*? Two.
3. Play the 10 pegs are soldiers; let them march in twos. How many twos? *Five.*

FORMATION OF TABLE.

5	5	5	5	5	5	
5	15	25	35	45	55	&c.
10	20	30	40	50	60	

Take one (small) bundle of slats, and five more. Children readily answer.

How many slats altogether? Fifteen.

Fifteen = ten 1 and 5=15
Take 5 *more* slats = 5= 5
How many are five and five = *Ten.*

We already have *one ten* and *this* ten make how many tens? Two tens.

Two tens = twenty.

$\therefore 15+5 = 20.$

So on with 25+5, and the other parts of the table.

DRILL.

When table is completed, drill in many ways till children know it perfectly.

1. Let the children repeat the table:
   (1) Without answer;
   (2) " constant figure;
   (3) " inconstant figure.

E.g.: (1)

5	5	5	5	5	
5	15	25	35	45	&c.

(2)

5	15	25	35	45
10	20	30	40	50

(3) Let them repeat the table rapidly now without guide of any kind.

NEXT STEP.

To show that any digit added to a number ending in "0" will have for its sum ending the digit added.

This is merely put in the form of a sum, thus:

6	9	3	8	7	4
10	20	40	10	50	30
16	29	43	18	57	34

Take a *ten* bundle and *six* slats.

How many? *16.*

Take *two* (*ten*) bundles and *nine.*

How many? *29.*

This lesson is easily taught and readily understood; the children give the answers rapidly and accurately.

We are now ready to apply our knowledge. Little sums may now be given both mentally and for slate work.

For mental work, examples given quickly, as follows:

Five, five.
Five, five, five.
Five, five, five, five, six.
&c.

Slate work, easy at first:

		8
9	5	5
5	5	5
5	5	5
5	5	5
5	5	5
		5
—	—	—

Have these little sums added rapidly. Insure against counting right from the beginning.

NEXT STEP.

Combinations 1 + 9, 9 + 1.

Teach as before—*Form table—drill.* Give examples—for *mental* and *slate* work.

Table	9	9	9	9	9	9	&c.
	1	11	21	31	41	51	
	—	—	—	—	—	—	

No necessity to take the numbers in order in the formation of the table, e.g.,

	9	9	9	9	&c.
	1	21	11	31	
	—	—	—	—	

This means, of course, when *teaching* the table when pupils are repeating the table, the numbers, of course, should be given in order, e.g.,

	9	9	9	9	&c.
	1	11	21	31	
	—	—	—	—	

CARRYING.

Carrying may now be introduced.

Take sum $\begin{matrix} 85 \\ 95 \end{matrix}$

Draw a little two-roomed house, making the *tens'* room and the units' room.

85 = eight (tens) and five.

95 = nine (tens) and five.

Five and five are how many? Ten.

Ten means *one* bundle and *no* single ones. Let the children show the *tens'* room. We have now *one more* ten to bring in, five, five are how many? Ten. Carry our *one* ten to its own room, then we have *one* ten, *nine* tens, and *eight* tens. Altogether how many? Eighteen tens, eighteen tens or one hundred and eighty = 180.

Tables should be committed to memory.

Teacher simply says: Table, five, five.

Pupils repeat it rapidly.

METHODS OF IMPRESSING TABLE.

(1) Oral repetition, as above, individually and in class.

(2) Place numbers down irregularly, as

5 25 15 45 35, &c.

Every time teacher points add *five*. Children give answers rapidly

(3) Number wheel. Teacher points to number on circumference of wheel. Pupils add to this the number in centre and give answers rapidly.

N.B.—Draw a circle on board, place "5" in centre, at distances on circumference place numbers 15, 35, 25, 45, etc.

(4) Let the pupils write out the table neatly on slates.

(5) Care should be taken that there is no guess work, but that each child understands the process clearly, *then* and only *then* will the working be intelligent.

Introduce next combinations, 2+8, 8+2.

So on with the others that make *ten*.

The teacher should have a book in which are placed

sums involving combinations taught. To make these sums, begin from the bottom upwards. For the guidance of the teacher, many sums will be found at the end of this little book which apply the new combination as soon as it is taught, and also review the old ones. Rapidity and accuracy are easily secured, and very young children learn to add without the habit of counting.

In *all* the combinations impress the sum *ending*. Thus,

5+5 ends in "0"
9+9 " "8" &c.

The signs + and — may be introduced at this stage, and readily understood.

To fix the combinations, to awaken interest and give variety, sometimes have a little game. Make a house—some of the little numbers live here. Mrs. *Ten* is the mother. Who are her children? The *twins*, *5* and *5* play always together. *1* and *9* walk to school together, *4* and *6* stay home help mother, *8* and *2* play under the tree when they come from school, *3* and *7* play always together.

N.B.—Draw a little house, call it Mrs. Ten's house; place the numbers as designated.

Points to be Remembered.

1. In the new combinations taught bring in always what has already been learned. For example, when the "*eights*" are taught, in the *mental* and *written* work constantly review the *nines*, *doubles* and *tens*.

2. *Individual adding* should be conducted at least *once* a day. Every child should be asked to add orally. If this practice is continued and no *new* combination taught till the *old* ones are thoroughly mastered the result will be intelligent, rapid and accurate addition.

3. Teach the combinations in *order*. Do not leave one till the children have obtained perfect mastery over it, and can use it readily and intelligently.

The combinations are given in the order taught, and a sample table is also given; one from each set of combinations.

SAMPLE TABLE

FROM EACH SET OF COMBINATIONS.

Tens—	8	8	8	8	8	8	8	
	2	12	22	32	42	52	62	&c.
	—	—	—	—	—	—	—	
	2	2	2	2	2	2	2	
	8	18	28	38	48	58	68	&c.
	—	—	—	—	—	—	—	

Impress endings, 2+8 ends in "0."
8+2 " "0."

Doubles—	7	7	7	7	7	7	7	
	7	17	27	37	47	57	67	&c.
	—	—	—	—	—	—	—	

Impress ending 7+7 ends in "4."

Nines—	5	5	5	5	5	5	5	
	4	14	24	34	44	54	64	&c.
	—	—	—	—	—	—	—	
	4	4	4	4	4	4	4	
	5	15	25	35	45	55	65	&c.
	—	—	—	—	—	—	—	

Impress ending 4+5 ends in "9."
5+4 " "9."

Eights—	2	2	2	2	2	2	2	
	6	16	26	36	46	56	66	&c.
	—	—	—	—	—	—	—	
	6	6	6	6	6	6	6	
	2	12	22	32	42	52	62	&c
	—	—	—	—	—	—	—	

Impress ending 2+6 ends in "8."
6+2 " "8."

Sevens—	8	8	8	8	8	8	8	
	9	19	29	39	49	59	69	
	—	—	—	—	—	—	—	

	9	9	9	9	9	9	9	
	8	18	28	38	48	58	68	
	—	—	—	—	—	—	—	

Impress ending 9+8 ends in "7."
8+9 " "7."

Sixes—	9	9	9	9	9	9	9	
	7	17	27	37	47	57	67	&c.
	—	—	—	—	—	—	—	
	7	7	7	7	7	7	7	
	9	19	29	39	49	59	69	&c.
	—	—	—	—	—	—	—	

Impress ending 9+7 ends in "6."
7+9 " "6."

Fives—	7	7	7	7	7	7	7	
	8	18	28	38	48	58	68	
	—	—	—	—	—	—	—	
	8	8	8	8	8	8	8	
	7	17	27	37	47	57	67	
	—	—	—	—	—	—	—	

Impress ending 8+7 ends in "5."
7+8 " "5."

Fours—	5	5	5	5	5	5	5	
	9	19	29	39	49	59	69	&c.
	—	—	—	—	—	—	—	
	9	9	9	9	9	9	9	
	5	15	25	35	45	55	65	&c.
	—	—	—	—	—	—	—	

Impress ending 9+5 ends in "4."
5+9 " "4."

Threes—	7	7	7	7	7	7	7	
	6	16	26	36	46	56	66	&c.
	—	—	—	—	—	—	—	
	6	6	6	6	6	6	6	
	7	17	27	37	47	57	67	&c.
	—	—	—	—	—	—	—	

Impress ending 6+7 ends in "3."
7+6 " "3."

Twos—	8	8	8	8	8	8	8	
	4	14	24	34	44	54	64	&c.
	—	—	—	—	—	—	—	
	4	4	4	4	4	4	4	
	8	18	28	38	48	58	68	&c.
	—	—	—	—	—	—	—	

Impress ending 4+8 ends in "2."
8+4 " "2."

Ones—	9	9	9	9	9	9	9	
	2	12	22	32	42	52	62	&c.
	—	—	—	—	—	—	—	
	2	2	2	2	2	2	2	
	9	19	29	39	49	59	69	&c.
	—	—	—	—	—	—	—	

Impress ending 2+9 ends in "1."
9+2 " "1."

Suggestions for Attaining Rapidity.

1. Teacher holds cards on which are two digits,

7
8

and says: "I shall show you a card just a second; when I hide it write on slates (1) the *sum* of the two digits, 15, (2) the two numbers that made the sum (7 and 8). (3) also the difference of the two numbers (1).

N.B.—The boys may give the sum, the girls the difference, and *vice versa*.

2. Place a number of strokes (soldiers) in groups. Ask how many altogether first, (2) how many groups, (3) what the groups were to make up the total. For instance:

1 1 1, 1 1 1 1, 1 1.

9 altogether.
3 groups.
Three, four, two made up the *nine*.

3. Let the children count by twos, threes, in concert; at a certain signal all stop—then tell how many twos, as

2, 4, 6, 8, 10, 12, 14—7 *twos.*
3, 6, 9, 12, 15—five *threes.*

4. Sets of addition columns are placed on blackboard—say, eight columns, one corresponding to each row in your class Select eight pupils to come to the board, let each pupil stand with back to the board, crayon in hand. Let the children in seat take column (corresponding to their row) down on their slates; at a given signal all add, those at the board as well. The idea is to see who has added the most quickly and accurately; besides, it adds a pleasing variety to the work.

5. Have *races.* Teacher selects any number, say 2. At the word "*go*" they all start at 2, adding *two* every time till 100 is reached, which is goal. Whoever is done first rises—if correct he wins the race.

Take the other digits another time. Teacher says 13—add two—Go. When *99* is reached, stop.

6. Place numbers in two columns. Call one the *plus* house, the other the *minus* house, e.g.:

+	−
4	9
2	3
1	2
6	4
3	7
8	6
5	5
9	8
7	1

This is a splendid exercise. It keeps up interest as well as exciting it. The teacher points to certain numbers. The operation is indicated by the house the number is in. For instance, the teacher points to 2, 6, 3, in the plus house, and to *seven* and *two* in the *minus* house. Answer, of course, is two. $11-9=2$.

This forms a good introduction later on for such questions as $423+567-314+287-109$, etc.:

+	−
423	314
567	109
287	
1277	423

$1277-423=854$. Answer.

Questions.

Involving Combination 5+5.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
6	9	7	8	1	5	4			3	0	7	8
5	5	5	5	5	5	5	6	2	5	5	5	5
5	5	5	5	5	5	5	5	5	5	5	5	5
—	5	5	5	5	5	5	5	5	5	5	5	5
16	—	—	5	5	5	5	—	5	5	5	5	5
	29	27	5	—	5	5	26	5	5	—	5	5
			—	31	5	5		5	5	30	5	5
			38		—	—		5	—		5	—
					45	44		—	43		5	48
								42			—	
											57	

				5+5,		1+9,			9+1.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
2	8	6	4	9	6	9	8	4	5	5	2	5
5	5	1	9	1	9	1	5	5	5	5	9	5
5	9	9	1	5	1	5	5	9	5	9	1	9
9	1	5	9	5	5	5	5	1	5	1	5	1
1	1	5	1	5	5	5	1	1	5	5	5	0
9	9	5	5	5	5	—	9	9	5	1	5	9
1	—	—	—	5	—	30	9	—	5	9	—	1
—	38	36	34	5	36		1	34	5	1	32	—
32				—			—		1	—		30
				50			49		9	50		
									—			
									60			

(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
85	55	97	56	59	11	54	95	55
95	55	15	55	51	95	55	19	50
—	95	95	95	99	95	95	91	95
180	—	—	—	—	—	—	—	—
	205	207	206	209	201	204	205	200

5+5, 1+9, 9+1, 2+8, 8+2.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		7					6			3	7			
		5					8		9	8	9			
8	6	5	7	6	4	9	2	7	1	2	1	4	6	7
8	9	2	8	9	2	1	2	1	9	5	5	1	9	8
2	1	8	2	1	8	0	8	9	1	5	5	9	1	2
9	2	9	1	2	1	2	9	8	5	2	5	5	5	1
1	8	1	9	8	9	8	1	2	5	8	5	5	5	9
5	2	8	9	5	8	9	5	1	8	1	5	8	2	5
5	8	2	1	5	2	1	5	9	2	9	5	2	8	5
38	36	47	37	36	34	30	46	37	40	43	47	34	36	37

(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
79	65	32	45	12	85	15	89	11
51	95	58	95	98	15	95	25	59
58	19	51	12	11	92	15	80	51
82	81	89	88	89	88	85	95	89
270	260	230	240	210	280	210	289	210

(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)
879	659	785	370	479	632	642	419
951	191	125	259	591	958	958	950
158	919	985	851	515	151	152	151
882	881	885	899	885	889	888	899
2870	2650	2780	2379	2470	2630	2640	2419

New Combinations, 3 + 7, 7 + 3.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
7				7		2		8	2	6	8	2	6
4		7	9	2	9	7	9	9	9	9	4	4	7
6	6	3	1	8	1	3	1	1	1	1	6	6	3
9	1	3	7	7	3	4	7	6	7	7	7	7	7
1	9	7	3	3	7	6	3	4	3	3	3	3	3
8	7	7	3	4	7	1	6	7	4	7	9	7	3
2	3	3	7	6	3	9	4	3	6	3	1	3	7
2	7	8	4	7	9	8	4	7	3	4	7	9	7
8	3	2	6	3	1	2	6	3	7	6	3	1	3
7	3	7	4	9	4	5	1	2	7	2	7	1	2
3	7	3	6	1	6	5	9	8	3	8	3	9	8
57	46	50	50	57	50	52	50	58	52	56	58	52	56

1	2	3	4	5	6	7	8
						77	
		97		57	68	35	27
49	69	73	98	33	72	75	73
63	44	32	14	79	37	34	37
77	76	38	76	41	93	96	43
37	37	79	37	66	17	17	68
33	73	71	33	94	93	83	92
77	32	31	77	18	15	27	11
73	78	69	73	62	65	63	69
409	409	490	408	450	460	507	420

1	2	3	4	5	6
779	749	991	897	472	378
334	367	117	773	458	737
426	353	373	334	656	743
687	757	737	796	174	363
783	323	473	317	938	757
327	789	632	783	772	357
673	671	488	321	339	983
		625	669	661	127
4,009	4,009	565			563
			4,890	4,470	
		5,001			5 008

1	2	3	4	5
				7976
				3131
		8392	2995	7299
		2717	8113	3813
7766	5749	7733	7737	7777
3347	5364	3377	3374	3337
2393	3396	6273	4776	7923
8717	7712	4834	6332	3186
3783	9588	4876	9278	8894
7327	1522	6231	1832	2216
6673	6678	5569	5568	4454
40,006	40,009	50,002	50,005	60,006

4+6, 6+4 New Combinations.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
											3		
											9		
9	5	2	7	6	1	3	2	3	4	8	1	5	7
8	4	4	2	5	6	5	6	4	6	6	8	9	6
2	6	6	8	5	4	5	4	6	4	4	2	1	4
4	9	6	6	2	6	6	4	4	4	4	4	4	4
6	1	4	4	8	4	4	6	6	6	6	6	6	6
6	8	9	4	9	2	6	9	4	6	9	8	6	8
4	2	1	6	1	8	4	1	6	4	1	2	4	2
6	8	9	5	1	8	2	9	5	4	4	9	2	8
4	2	1	5	9	2	8	1	5	6	6	1	8	2
49	45	42	47	46	41	43	42	43	44	48	53	45	47

1	2	3	4	5	6	7	8	9	10
49				47	47		85	93	52
62	59	94	11	62	65	39	29	11	54
88	81	46	49	28	85	51	91	49	96
24	24	64	64	86	24	56	16	66	16
96	96	96	26	94	96	54	44	44	64
16	16	18	88	11	16	54	64	68	45
54	84	52	82	59	84	86	86	52	85
59	26	52	25	51	28	24	28	51	26
61	64	68	65	69	62	66	62	69	61
509	450	490	410	507	507	430	505	503	502

1	2	3	4	5	6	7	8
				987			
821	374	893	681	124	879	731	754
459	946	457	199	456	651	699	696
652	161	654	914	652	452	412	419
948	429	926	256	698	428	858	241
165	685	189	858	419	684	254	868
845	585	681	982	481	486	486	882
266	525	421	126	629	624	624	225
664	665	669	664	561	666	666	665
4,820	4,370	4,890	4,680	5,007	4,870	4,730	4 750

1	2	3	4	5
	7571	9785	3975	5274
6945	4489	4815	4645	9446
4162	6624	6294	6462	1662
9448	2946	5446	9468	4648
1668	8166	5668	1644	6461
5862	8954	8682	8646	8589
5241	2152	2421	2464	2521
6679	6668	6669	6666	6669
40,005	47,570	49,780	43,970	45,270

1	2	3	4	5
58753	27529	75174	27371	73765
11997	45491	49496	45949	45415
99114	65614	61612	65164	65699
94246	19256	98948	19256	22491
16866	91854	12169	91852	88616
84984	89286	86851	89288	98984
26121	21824	24251	21824	12126
66669	66666	66669	66666	66664
458,750	427,520	475,170	427,370	473,760

5+5,	1+9,	9+1,	2+8,	8+2,	4+6,	6+4,	3+7,	7+3.	
								2	8
								3	7
					7	5	5	7	3
		7	5	3	4	3	4	6	4
9	8	3	5	7	6	7	6	4	6
5	5	8	8	1	8	7	6	1	8
5	5	2	2	9	2	3	4	9	2
5	6	8	9	6	9	2	2	1	2
5	4	2	1	4	1	8	8	9	8
5	6	8	9	7	5	7	6	5	1
5	4	2	1	3	5	3	4	5	9
39	38	40	40	40	47	45	45	52	58

59	57	69	98	72	17	42	32	11
55	55	51	19	48	43	58	78	97
65	65	58	71	61	62	59	35	23
45	46	62	39	69	68	71	85	84
85	84	47	81	41	48	39	25	56
		73		79	72	71	75	56
309	307		308					74
		360		370	310	340	330	
								401

978	945	472	633	436	916	572
139	166	458	479	894	224	248
561	874	656	861	215	889	867
545	231	174	245	685	651	563
785	789	938	785	425	458	544
		772		775	772	776
3008	3005		3003			
		3470		3430	3910	3570

5672	4672	6461	6761	4594	5261
6858	5298	9139	9529	6317	5843
4259	5815	1978	1581	7753	7317
9861	9695	5262	9699	3952	3792
1241	1416	5845	1411	6148	6958
7779	7774	7775	7779	4062	4154
				7678	6676
35670	34670	36460	36760	40504	40001

62434	34356	54739	14317	95249
48672	76759	56375	96791	15865
99418	29841	39965	39229	59145
11699	81268	71142	71885	51969
76591	85862	58248	85865	98371
34512	25243	52862	25245	12732
66678	66677	66678	66675	66678
400004	400006	400009	400007	400009

Review Exercises.

TENS.

5	1	9	8	2	6	4	7	3
5	9	1	2	8	4	6	3	7
5	5	9	1	8	5	4		
15	45	31	19	42	35	26		
5	9	1	8	2	3	7		
25	11	39	32	58	17	53		
5	9	7	3	8	2	4	6	
55	51	13	67	12	68	46	24	

1	2	3	4	5
5672	4672	6461	6761	
6858	5298	9139	9529	9445
4259	5815	1978	1581	1663
9861	9695	5262	9699	8747
1241	1416	5845	1411	2362
7779	7774	7775	7779	7898
3337	3338	3335	3337	3216
6663	9872	3845	8943	7864
4445	1239	7265	2163	3248
5555	5551	5555	5557	5562
55670	54670	56460	56760	50005

6	7	8	9
	82685	68282	72784
39757	47375	77748	24196
71354	63737	33365	86917
71356	77243	97745	77273
39751	33869	13365	33837
99759	72261	96975	43423
11352	38849	14136	67689
84758	79861	94874	19281
26352	31241	16231	91825
55568	55559	55559	55555
500007	582680	568280	572780

$9+9=18$.

Oral Exercises.

9	9	9	9	9	9	9	9	9	9	9	9
9	29	49	39	19	59	79					
—	—	—	—	—	—	—					

1	2	3	4	5	6	7	8	9	10	11	12
											6
						2	2	9	9	9	2
		1	9	6	9	9	9	9	9	9	9
	2	2	9	2	9	9	9	2	2	2	9
2	9	9	2	9	9	2	7	9	9	9	9
9	9	9	9	9	1	9	3	9	9	9	1
9	7	5	9	8	3	9	6	8	7	8	9
2	3	5	2	2	7	2	4	2	3	2	1
9	5	6	9	7	3	9	6	4	3	2	9
9	5	4	9	3	7	9	4	6	7	8	1
—	—	—	—	—	—	—	—	—	—	—	—
40	40	41	58	46	48	60	50	58	58	58	56

N.B.—Use one column sums for Oral addition.

1	2	3	4	5	6	7	8	9
							292	
			69	99		272	999	879
72	69	76	29	99	267	929	959	429
29	29	22	99	25	922	999	752	694
99	92	99	91	95	999	492	379	596
96	99	99	29	95	299	629	239	527
74	79	82	91	65	952	499	922	993
36	37	29	97	45	959	692	989	194
64	63	69	63	65	669	558	549	566
—	—	—	—	—	—	—	—	—
470	468	476	568	588	5067	6070	6080	4878

8+8=16.

Oral Exercises.

8	8	8	8	8	8	8	8
8	28	48	18	58	38	68	88

1	2	3	4	5	6	7	8	9	10	11	12
	4								8	8	8
4	8		8			9			9	8	8
8	8	7	8	8	8	1	4	8	9	2	4
8	7	4	7	9	9	4	8	9	4	9	8
4	3	8	3	9	9	8	8	9	8	9	9
8	8	8	7	8	4	8	8	4	8	9	9
8	2	2	3	2	8	4	2	6	4	1	2
8	3	9	7	5	9	8	8	4	8	7	9
2	7	9	3	5	9	8	2	6	8	3	9
50	50	47	46	46	56	50	40	46	66	56	66

1	2	3	4	5	6	7	8	9	10	11
58										
48							88			
84	24	74	74	43	52	42	88	578	244	547
88	48	28	28	84	29	89	24	428	488	982
78	89	98	98	88	99	99	98	894	888	189
37	89	98	99	28	98	99	98	398	844	249
63	72	62	51	92	52	51	94	968	488	984
48	39	47	59	99	57	57	18	147	689	988
52	59	63	61	69	63	63	58	663	559	568
556	420	470	470	503	450	500	566	4576	4200	4507

$7+7=14$.

Oral Exercises.

7	7	7	7	7	7	7
7	47	27	17	57	37	67

1	2	3	4	5	6	7	8	9	10	11	12
						6			4		6
			5	7		7	2	6	8	7	7
5	6	7	6	7	7	7	4	7	8	7	7
6	7	7	7	4	7	4	8	7	6	6	2
7	7	2	7	8	6	8	9	5	7	7	9
7	8	9	9	8	7	9	9	5	7	7	9
6	2	9	1	2	7	9	6	6	2	2	4
7	8	7	9	9	7	1	7	7	9	9	8
7	2	3	1	9	3	9	7	7	9	9	8
45	40	44	45	54	44	60	52	50	60	54	60

1	2	3	4	5	6	7	8	9
				87	763	725	427	727
97	97	65	77	87	776	765	867	247
60	67	74	77	64	277	472	874	986
76	76	78	94	78	927	878	278	987
77	77	68	16	78	982	869	448	247
87	77	72	86	92	984	971	782	986
28	37	79	27	19	127	179	789	987
72	63	69	67	59	567	561	559	557
497	494	505	444	564	5403	5420	5624	5724

$6+6=12.$

Oral Exercises.

6	6	6	6	6	6	6
6	26	46	16	36	56	76

1	2	3	4	5	6	7	8	9	10	11	12
8	6						8	6	8	8	
6	8	6	7	6	6	6	6	6	6	6	4
6	0	8	8	6	6	6	6	8	6	6	8
8	6	8	6	8	7	2	6	6	2	8	8
6	6	6	8	6	3	9	7	6	9	6	8
6	4	7	8	6	6	9	7	8	9	6	6
8	6	7	2	8	4	2	6	6	6	8	8
6	7	6	9	6	8	9	7	8	7	6	9
6	3	4	9	6	2	9	7	8	7	6	9
60	46	52	57	52	42	52	60	62	60	60	60

1	2	3	4	5	6	7	8
56	58		786		785	685	
86	86	68	866	988	868	765	678
68	66	66	688	986	666	768	679
66	66	26	686	886	888	486	869
76	74	98	948	668	964	868	672
36	36	96	169	666	967	869	679
64	64	66	559	666	567	559	669
452	450	420	4702	4860	5705	5000	4246

1	2	3	4	5	6
					26080
47667	68626	88887	57897	58662	67266
87678	86698	68698	27698	26629	87066
82876	46698	62696	84886	46849	88828
99658	79786	99878	98966	75672	96692
19659	71727	19239	18964	75679	16695
66669	66667	66669	65676	66769	57575
404207	420202	406067	354087	350260	440202

$4+4=8.$

Oral Exercises.

4	4	4	4	4	4	4
14	64	34	54	24	44	4

1	2	3	4	5	6	7	8	9	10	11	12
				4	8		4		4		
8	9	4	1	4	8		4	4	4	6	6
8	2	4	2	8	2	4	8	4	8	6	2
2	4	8	4	6	4	4	6	2	6	2	4
4	4	6	7	8	4	8	6	9	8	4	4
4	2	6	7	8	2	6	2	9	8	4	2
2	4	8	6	2	4	8	4	8	4	2	4
9	7	6	7	9	7	9	7	6	8	9	7
9	7	6	7	9	7	9	7	6	8	9	7
46	39	48	41	58	46	48	48	48	58	42	36

1	2	3	4	5	6	7	8	9
24	84	29	66		954	484	658	5869
47	48	49	86	27	224	464	826	2629
77	78	42	48	92	442	268	948	4842
72	72	84	46	94	449	426	949	4844
89	29	64	26	24	829	446	229	2224
69	49	82	48	44	642	978	442	4942
66	47	84	46	48	649	176	449	4944
64	53	74	56	78	769	566	749	4774
508	460	508	422	407	4958	3808	5250	35068

3+3=6.

Oral Exercises.

3	3	3	3	3	3	3	3	3	3	3
3	43	23	63	13	53	33				

1	2	3	4	5	6	7	8	9	10	11
								4		3
						3	3	3	4	3
3	8		3	3	3	3	3	3	3	4
3	8	4	3	3	3	2	4	4	3	3
4	4	3	4	8	8	4	3	3	8	3
3	3	3	3	6	6	4	3	3	6	8
3	3	2	3	6	6	2	4	2	6	6
4	2	4	4	8	8	4	8	4	8	8
3	9	7	8	6	6	7	9	7	6	9
3	9	7	8	6	6	7	9	7	6	9
26	46	30	36	46	46	36	46	40	50	56

1	2	3	4	5	6	7
						5423
473	36	646	37	437	3988	2443
343	33	338	37	334	3966	4842
388	43	339	24	323	2883	4684
246	88	249	48	443	4643	4364
448	96	438	44	872	7342	3332
429	93	436	27	879	7329	3234
749	73	756	47	779	6649	7484
3076	462	3202	264	4067	36800	35806

$2+2=4,\ 1+1=2.$

Oral Exercises.

2	2	2	2	2	2	1	1	1
2	42	12	32	52	62	41	11	81
—	—	—	—	—	—	—	—	—

1	2	3	4	5	6	7	8	9	10	11
	5	2	6	1	2	3	5	4		2
2	2	6	3	1	2	3	8	3	8	6
2	4	3	3	2	2	2	6	3	4	8
2	2	3	2	4	4	4	3	2	2	4
4	2	2	4	2	7	2	3	4	6	4
4	8	4	4	2	7	6	2	4	6	6
2	6	2	2	4	6	8	4	4	8	2
4	3	1	9	8	7	9	7	8	6	1
4	3	1	9	8	7	9	7	8	6	1
24	35	24	42	32	[illegible]	46	45	40	46	34

1	2	3	4	5	6	7	8
					12		
				26	12		31
63			44	43	22	62	31
83	26	58	32	73	44	36	22
42	43	24	36	72	22	33	44
24	23	44	26	84	62	23	22
12	62	72	48	62	36	42	12
11	64	79	46	61	32	49	17
91	84	79	76	81	82	79	83
326	302	356	308	502	324	324	262

9	10	11	12	13	14
		743	642	634	742
658	466	783	826	836	224
829	788	282	463	428	462
449	748	424	238	244	236
272	822	792	132	622	138
274	624	791	129	626	129
774	374	591	849	876	849
3256	3822	4406	3284	4264	2780

15	16	17	18	19
	2286	8848	8728	
7262	4948	4424	4214	2329
2632	2924	2262	2912	6349
9834	6262	6166	2986	8272
9422	8481	8126	9268	4479
4246	8241	4892	1434	2269
8148	9628	2194	5232	1672
8129	1861	6127	5226	1679
7749	5431	3647	6746	7559
57422	50062	46686	46746	34608

New Combinations.

NINES.

1+8, 8+1, 2+7, -2.

Oral Exercises.

8	8	8	8	7	7	7	7
1	31	11	21	12	42	32	52

1	2	3	4	5	6	7	8	9	10	11	12	13
			8									
			1			1	8	1			1	8
8			8	8	8	8	1	8	7	9	8	4
9	9	9	6	9	1	8	6	4	7	9	1	2
1	8	1	6	8	8	6	2	8	2	2	8	6
9	1	4	2	1	6	3	2	4	9	4	6	6
1	4	4	4	8	8	3	8	7	8	4	6	2
9	8	8	2	2	4	2	6	7	1	1	8	4
8	9	6	1	7	7	9	3	6	9	8	6	7
1	9	6	1	3	7	9	3	4	1	1	6	7
46	48	38	39	46	49	49	39	49	44	38	50	46

1	2	3	4	5	6	7	8
		87	11	28			
18	84	93	14	14	58	29	27
19	17	82	42	14	44	41	97
48	17	18	76	41	14	89	82
21	82	88	76	79	88	49	19
62	14	62	88	74	16	42	13
89	47	86	66	28	43	29	18
49	37	44	36	48	33	49	48
306	298	560	409	326	296	328	304

2+7, 7+2.

Oral Exercises.

7	7	2	7	7	2	7	2				
22	42	37	12	52	67	32	17				
—	—	—	—	—	—	—	—				
1	2	3	4	5	6	7	8	9	10	11	12
—	—	—	—	—	—	—	—	—	—	—	—
			2				7	8	8 9	9	7
1	9	1	7	8	8	7	2	9	7	7	2
1	2	7	1	9	4	2	1	7	6	2	1
9	7	2	7	7	7	1	7	6	6	7	1
7	4	4	2	6	7	7	2	8	2	3	9
2	8	8	4	6	2	2	8	4	4	7	8
1	9	4	8	8	4	2	2	2	2	3	1
7	8	7	9	6	7	9	5	6	1	6	9
2	1	7	9	6	7	9	5	6	1	4	1
—	—	—	—	—	—	—	—	—	—	—	—
30	48	40	49	56	46	39	39	56	46	48	39

1	2	3	4	5	6	7	8	9
—	—	—	—	—	—	—	—	—
		92			82		77	
77	71	27	94	59	97	61	22	47
62	27	72	88	47	71	89	41	84
81	96	19	19	82	68	47	87	98
91	96	21	17	42	61	46	46	74
29	48	74	76	24	82	88	48	22
77	86	47	28	67	69	64	29	46
82	46	37	58	37	39	34	49	36
—	—	—	—	—	—	—	—	—
499	470	389	380	358	569	429	399	407

4+5, 5+4.

Oral Exercises.

4 5	5 14	4 35	5 24	4 45	5 54	5 34			
1	2	3	4	5	6	7	8	9	10
		4			1			7	9
9	9	5	9	8	4	9	9	1	1
5	4	2	4	9	5	4	1	5	9
4	5	9	5	5	1	5	9	4	5
1	2	7	1	7	7	4	7	1	7
1	9	2	4	7	6	8	6	4	7
9	7	4	5	8	8	4	8	5	4
5	6	8	5	6	9	7	4	5	8
4	6	8	5	6	9	7	4	5	8
38	48	49	38	56	50	48	48	37	58

1	2	3	4	5	6	7	8	9
					99		44	89
		82	54		44	69	55	97
14	94	97	45	98	55	75	11	42
95	45	41	41	79	11	34	47	51
74	51	57	84	65	54	11	56	18
28	14	12	45	64	45	58	86	51
89	45	51	26	81	88	21	68	21
65	55	48	67	67	61	62	86	68
34	85	81	37	32	31	38	46	31
399	389	469	399	486	488	368	499	468

3+6, 6+3.

Oral Exercises.

3 / 6	6 / 33	3 / 46	6 / 13	3 / 26	6 / 53

1	2	3	4	5	6	7	8	9	10
								3	
						3		8	
		6		5	8	6	5	9	3
8	9	3	3	1	9	1	7	4	8
9	3	1	3	3	4	5	7	5	9
6	8	7	3	8	5	2	1	1	5
3	9	2	2	9	1	6	3	3	7
2	1	1	9	3	3	6	8	8	7
9	9	5	3	8	8	8	9	9	2
6	5	7	3	4	9	6	3	8	9
3	4	7	3	4	9	6	6	1	9
46	48	39	29	45	56	49	49	59	59

1	2	3	4	5	6	7	8	9	10
17	37	49	88	99					
	2	51	99	61	56	27			19
	91	19	47	39	41	91	17	31	92
	73	73	56	23	17	68	66	88	99
3	28	68	16	98	62	31	38	41	86
84	19	64	78	34	32	21	14	22	13
98	36	27	26	87	19	47	37	69	16
62	33	47	56	47	69	22	37	39	74
409	399	398	466	488	296	307	209	290	399

Review of Nines.

1	2	3	4
8983	9893	9147	1627
9398	4928	5254	1391
5849	5679	7716	4068
4957	1327	7837	5831
1716	5192	1683	4121
7678	7134	3648	6147
2829	7988	8842	7622
5459	6548	8625	3425
		5345	7675
46869	48689	58097	41907

5	6	7	8
97882	74592	19893	81898
36999	15179	33938	45934
88655	31327	88789	27282
99347	86826	99293	17796
47117	93496	24128	11136
52376	48254	75374	83788
22827	56248	22827	28296
44457	73658	44447	64556
489660	479580	408689	360686

1+7, 2+6, 6+2, 3+5, 5+3.

Oral Exercises.

7	6	2	7	6	5	3	5	2
11	22	56	31	42	13	45	33	76
—	—	—	—	—	—	—	—	—

1	2	3	4	5	6	7	8	9	10
					9			8	7
7		4	6	5	6	3	7	7	1
2	6	4	2	4	3	5	1	1	2
2	8	2	2	2	2	2	2	2	2
7	7	9	6	6	4	4	6	5	8
1	1	9	2	2	4	4	6	3	3
2	4	2	2	2	2	4	8	2	5
7	8	9	6	7	5	8	9	6	2
1	8	9	2	1	3	8	9	2	5
29	42	48	28	29	38	38	48	36	3
									38

11	12	13	14	15	16	17	18	19
				27	83			57
				81	25	92	82	21
18	89	29	29	32	62	18	78	72
58	25	87	95	55	27	27	15	15
32	64	52	64	23	71	81	23	23
22	21	31	31	42	12	52	78	42
47	46	25	17	42	29	37	16	49
21	23	64	72	86	59	81	76	79
198	268	288	308	388	368	388	368	358

20	21	22	23	24	25
		596			285
969	225	392	189	216	873
185	893	225	156	893	712
954	652	743	933	552	122
331	249	142	121	344	148
827	216	227	947	117	349
562	573	561	722	777	379
3828	2808	2886	3068	2899	2868

26	27	28	29	30
1127	8228	6922	7522	6268
2682	8967	2175	1385	8985
8255	6521	4613	5173	6743
6233	2412	4222	4612	2242
2426	6153	2194	1319	2114
9264	3725	6674	7869	5674
29987	36006	26800	27880	32026

Review of Eights.

1	2	3	4
2862	9893	8583	7213
8788	7395	3235	1845
2135	2522	5752	7522
8253	1246	2124	2364
4722	5376	9227	1187
2164	4578	9787	5797
6267	1229	1188	4296
3437	6449	3226	1127
38628	38688	3446	6547
		46568	37898

5	6	7	8
81882	29583	83253	88137
35578	81398	26635	32951
53317	54254	61222	58422
12121	37242	25526	23526
72522	17816	94386	25186
28485	42376	71276	82136
17193	54522	21418	74752
51794	24229	19426	14124
42228	47449	66746	21297
74548			46457
469668	388869	469888	466988

1+6, 6+1, 2+5, 5+2.

Oral Exercises.

6	6	2	5	2	5	2
11	31	5	22	15	42	55

2	6	1	7	8	5	8	7	3	2	7
6	1	2	2	1	2	4	5	2	5	2
1	1	1	5	6	6	7	6	5	1	5
3	2	8	3	7	7	5	6	3	3	3
6	6	5	5	2	5	6	2	5	8	1
1	1	3	2	5	6	8	4	2	4	8
3	4	2	2	3	8	4	2	6	2	8
6	8	4	9	5	9	7	1	7	6	2
1	8	4	9	2	9	7	1	7	6	4
29	37	30	44	39	57	56	34	40	37	44

74		84	28	75	73
27	54	37	53	27	27
52	67	51	25	56	55
35	75	18	22	11	12
26	26	74	86	74	42
57	58	22	27	28	54
15	29	16	82	24	17
62	49	66	55	54	67
348	358	368	378	349	347

3+4, 4+3, 9+8, 8+9.

Oral Exercises.

3	2	8	4	3	9	8	4
14	25	19	33	54	28	49	13

	3	8	9		3	3				8
6	1	9	2	7	4	3	5	8	1	9
3	2	3	6	4	3	9	2	9	8	3
8	4	6	2	3	8	4	3	3	5	9
5	3	1	5	6	7	7	9	5	3	8
2	3	3	3	7	2	5	4	6	2	3
9	8	5	2	5	1	2	7	8	4	9
9	9	2	7	5	6	6	8	9	7	9
			1	4	3	4	9	9	7	9
46	33	37	37	44	37	43	47	57	37	67

					747
863	462	543	349	472	375
235	788	439	876	326	792
482	545	368	843	462	583
393	225	812	133	321	239
316	366	939	134	325	299
471	434	839	753	564	449
2760	2820	3940	3088	2470	3484

Review of Sevens.

1	2	3	4
6487	2949	1382	9158
1728	9635	7869	9736
3569	6214	2129	5283
4212	3261	1422	4161
3339	1138	2724	2337
8539	7581	4534	6382
27874	30778	20060	37057

5	6	7	8
			86168
	82125	38597	54389
97738	29983	79322	38853
33579	93459	92385	25233
57253	58532	12353	33327
28328	39128	88738	53722
62632	15762	26225	15985
68199	74268	52522	72966
82289	21184	52286	28927
44459	56544	65446	56557
474477	470985	507874	466127

1+5, 2+4, 4+2, 9+7, 7+9.

Oral Exercises.

4	5	4	7	9	7	2				
42	11	32	19	47	9	34				
—	—	—	—	—	—	—				
				3						
6		6	4	4	8	4	4	8		
5	5	4	2	3	5	6	2	5	4	
1	1	6	6	1	3	9	4	3	4	
4	4	2	7	9	2	7	9	2	6	
3	9	4	9	9	7	4	9	2	9	
3	9	4	4	4	1	9	9	8	7	
6	9	4	7	7	2	9	9	2	4	
4	9	2	9	6	9	9	6	8	9	
—	—	—	—	1	—	—	4	8	7	
32	46	32	48	46	47	46	66	56	46	50

	47	42				
17	94	22	72	29	69	55
25	93	47	93	95	36	43
34	53	79	53	53	12	72
71	31	92	34	42	22	99
98	23	15	48	15	34	15
61	66	63	48	73	24	74
306	407	360	348	307	197	358

989	922	297	644	614
686	939	685	966	466
243	946	752	749	678
171	913	946	469	398
397	136	227	789	344
282	834	559	649	288
2768	4690	3466	4266	448
				3266

5486	3674	8972	6352	7472
3968	9828	6293	3823	3726
8728	8518	2323	9634	4892
9414	9344	1244	8254	2194
2734	3257	2645	6224	1327
4732	4669	5391	2692	6459
35062	39290	26868	36979	26070

Review of Sixes.

1	2	3	4
67564	76425	92363	37754
42364	99683	74598	38819
61896	47922	49272	49249
83899	48982	48943	43349
48129	66348	22447	62763
49289	43574	43569	45848
76439	23277	87179	22224
	56477	44449	64454
429580	462688	462820	364460

5	6	7	8
65893		46776	48289
43997	73767	64984	66727
62524	95262	52492	27434
92446	64125	13442	49574
98128	78496	43672	48186
42862	82537	57498	56194
78185	28289	17225	17926
44645	46448	66553	46546
528680	468924	362642	360876

1+4, 3+2, 2+3, 8+7, 7+8, 9+6, 6+9.

Oral Exercises.

4	2	3	4	8	6	9
11	23	42	18	47	19	36
4	9	7	8	2	3	9
31	46	58	27	33	72	26

1	2	3	4	5	6	7	8	9
1	2			9				7
4	3	4	9	6	2		5	5
5	5	1	6	4	9	7	7	7
4	4	5	5	7	6	8	8	5
1	1	3	6	9	5	5	5	3
5	5	2	4	4	7	7	2	2
4	3	2	5	3	8	8	3	6
1	2	4	5	3	5	5	5	2
7	2	7	6	6	7	6	7	6
3	8	7	9	4	8	9	8	4
35	35	35	55	55	57	55	50	47

10	11	12	13	14	15	16	17
11	27	77	95	22	79	56	15
73	93	95	77	69	93	88	37
72	34	22	58	76	53	78	28
25	43	43	95	95	74	54	14
14	26	45	63	47	85	94	37
81	81	82	72	38	81	32	29
276	304	364	460	347	465	402	160

18	19	20	21	22	23
475	675	964	255	542	456
247	347	774	397	359	997
678	238	775	668	176	979
695	415	229	755	285	414
427	429	417	377	219	424
348	836	369	248	266	732
2870	2940	3528	2700	1847	4002

Review of Fives.

1	2	3	4	5
2352	5227	1945	5117	6882
6769	7134	6697	1468	9555
7896	8454	9508	7295	8399
1555	4091	5755	2259	9249
2767	6567	7876	1277	8269
3468	9282	4745	8[illegible]	6879
				3449
24807	4085	36560	[illegible]	52682

6			9
35585		45972	66543
99354		87499	97365
86231	74766	28686	79272
45527	81545	65845	23522
77442	35669	98974	28338
98141	83949	57721	82272
41128	32569	95235	63288
16661	72715	68173	27824
	74449	42442	54444
500069	45577	590547	522868

2+2, 7+[illegible], 1+3, 3+1, 9+5, 5+9, 8+6, 6+8.

Oral Exercises.

21	5	5	8	6	8	3
		9	46	18	26	31
7	2					
17	42	25	8	6	5	7
			36	48	49	47

1	2	3	4	5	6	7	8	9	10	11
3			8	6						5
1		5	4	8				9	6	9
2	3	3	2	6		4	1	6	8	6
4	1	1	2	2	5	6	3	5	6	6
7	5	2	2	2	7	4	1	1	6	4
7	9	2	4	4	4	6	9	9	2	8
2	9	8	3	2	9	8	5	5	2	8
4	9	4	1	2	5	2	2	2	2	4
3	9	7	1	2	6	4	4	4	4	2
1	9	7	9	2	9	9	5	5	7	6
				8	5	5	9	9	7	6
34	54	39	36	44	50	48	39	55	50	64

12	13	14	15	16	17	18
25	44					
33	18	56	75	27	93	49
42	96	78	59	37	57	79
12	52	42	76	12	28	89
24	64	94	85	94	45	79
23	89	58	29	59	86	29
31	35	76	46	75	39	59
190	398	404	370	304	348	384

19	20	21	22	23
196	171	791		
158	982	619	145	667
412	662	826	667	847
954	551	725	448	692
557	955	987	765	914
767	329	838	786	556
			769	768
3044	3650	4786	3580	4444

Review of Fours.

1	2	3	4	5	6
					4994
9496	5965	6549	3966	5365	8399
5658	4589	2365	3488	4857	6299
5422	1222	4582	6622	7578	2599
1744	2444	9224	9844	5485	4429
8789	2677	5328	7287	4129	9189
3735	3547	8536	7537	7646	2539
34844	20444	36564	38744	35060	38448

7	8	9	10
	66449	24666	32569
86584	94656	87944	67749
84589	94495	72589	23829
47549	71653	58265	88529
27569	32472	37312	42369
28529	84785	95554	36279
26589	68724	27956	19572
43539	32651	44258	66148
344948	545885	478544	377044

1+2, 8+5, 5+8, 4+9, 9+4, 6+7, 7+6.

Oral Exercises.

1	2	3	4	5	6	7	8	9	10	11	12
3	2		1	2	2				2		7
2	2	4	7	8	4	8	7	9	1	2	3
1	1	5	3	2	3	7	3	9	7	1	2
7	7	2	5	7	9	5	7	5	5	7	1
1	7	3	8	6	4	8	6	2	8	5	7
6	1	5	7	7	7	7	7	4	7	8	2
9	9	8	5	7	9	8	7	6	5	4	1
9	6	7	5	3	4	5	6	8	5	3	7
9	7	5	8	7	3	8	1	6	5	5	2
9	7	8	5	6	7	2	9	4	8	8	1
56	49	47	54	55	52	58	53	53	53	43	33

2	2	2	8	5	7	6	4	9	4	8
21	51	11	15	38	46	7	19	34	29	45

1	2	3	4	5	6	7	8
							59
75	23	25	53	88	97	43	89
68	95	67	25	25	56	87	79
44	18	36	88	43	44	16	99
33	97	47	57	99	13	25	49
39	47	38	44	44	34	27	89
74	76	45	39	34	39	38	69
333	356	258	306	333	283	236	533

1	2	3	4	5	6
					589
453	432	227	582	172	259
845	985	562	227	265	759
178	358	541	966	578	379
117	417	757	447	897	949
229	937	929	378	744	429
534	236	234	435	979	669
2356	3365	3250	3035	3635	4033

7	8	9	10	11
				7238
5393	8575	5855	5293	6945
5742	2557	3559	5895	7698
5911	7557	4584	2248	4876
5927	3563	7977	4827	5548
5429	7377	9592	7564	5799
5234	3676	7221	3739	5459
33636	33305	38788	29566	43563

Review of Threes.

1	2	3	4
77477	46578	37375	37843
33333	94532	78737	83297
66355	77596	35363	24843
40558	93544	47476	99237
64454	19577	98977	47886
78253	24543	82866	84557
29258	17532	25247	29224
46645	59431	54597	56449
436333	433333	460638	463336

5	6	7
74975	72673	436946
39244	77435	937953
82557	33874	583724
24457	89235	628563
63664	25889	882758
21443	99552	256839
22549	52229	724928
34554	54449	447741
363443	505336	4899472

8	9	10
734629	797521	892445
372774	639546	236898
484851	786559	644777
325695	522829	489577
531663	476799	726633
274952	237989	658969
387575	699889	786548
929384	328349	967858
434571	866879	992228
4476094	5356360	6395933

1+1, 6+6, 3+9, 9+3, 4+8, 8+4, 5+7, 7+5.

Oral Exercises.

6	9	3	8	4	8	7	7	5	5
26	13	49	24	18	54	15	25	37	57
—	—	—	—	—	—	—	—	—	—

1	1	3	3	1				4		3
1	1	7	7	9		8	9	8	8	9
6	8	9	3	3	9	5	8	8	4	8
2	6	3	7	2	9	7	8	8	5	8
6	6	8	9	4	2	8	2	8	1	4
6	8	9	3	8	5	9	5	2	3	8
8	6	3	8	2	7	9	7	5	9	4
6	8	6	3	4	8	2	7	7	8	4
6	8	4	9	8	7	5	7	8	6	7
				4	5	7	6	7	6	7
42	52	52	52	45	52	60	59	62	50	62

92	71	91	52	52	34	63
57	89	39	99	98	99	89
45	33	89	33	34	83	38
28	18	32	98	98	18	38
67	29	37	46	47	26	32
35	33	35	76	75	36	37
						25
324	273	323	404	404	296	322

111	594	652	773	255	789
777	942	877	855	977	889
885	384	945	578	988	249
928	892	928	647	874	589
338	537	266	929	857	729
764	685	936	794	469	659
3803	4034	4604	4576	4420	3904

5741	7712	9171	3478	7945
9887	7687	8779	9257	4479
3265	8745	8959	7745	2296
8625	5488	4912	9598	7336
6766	2966	2437	4296	5397
3636	4736	4835	8446	8248
37920	37334	39093	42820	35700

Review of Twos.

54533	28569	43367	37773
58577	82549	87944	78587
58853	23529	83834	82628
84777	37599	87472	23272
26548	97639	48486	73756
38842	83989	81228	57588
72646	25839	23639	83234
27246	62529	52259	92454
422022	442242	508229	529292

54958	858672	
58852	882788	759858
88887	888922	685988
29225	832239	297838
63776	815998	954938
48537	855922	957988
23228	835246	697948
55459	867328	666928
422922	415579	257468
	7252694	5279054

279442	248972	
873443	954918	946488
238848	378992	246789
782222	669988	346789
355957	823992	346789
377679	978999	346789
778556	953983	346789
458895	289948	346789
482797	838828	346789
866528	323654	646789
5494367	6462274	3920800

2+9, 9+2, 4+7, 7+4, 3+8, 8+3, 5+6, 6+5.

Oral Exercises.

9	7	2	7	4	7	8	3	6	5	3
12	34	29	14	27	54	13	28	15	36	48
—	—	—	—	—	—	—	—	—	—	—

9	2	7	4	8	8	5	5		9
32	49	24	17	23	43	16	56		42
—	—	—	—	—	—	—	—		—

	7	2	4	5	5	5	2			7
2	2	8	7	4	3	6	8	1	9	4
9	9	9	9	4	8	8	2	5	9	9
9	9	2	2	7	9	1	8	6	9	3
9	9	6	8	2	3	6	2	9	9	7
2	2	4	2	7	9	5	9	8	9	2
9	2	6	8	7	8	8	8	2	9	8
9	9	7	7	7	3	1	2	3	9	4
2	9	7	4	7	8	8	3	9	9	6
						3	7	9	9	5
										6
51	58	51	51	50	56	51	51	52	81	61

99						22
12	96	79	29	99		29
39	19	48	18	21	99	22
86	89	93	82	98	88	69
75	38	79	38	93	72	79
36	97	48	96	29	48	24
64	84	63	85	26	42	28
				45	39	53
411	423	410	348	411	388	331

	698	978	952			
919	827	323	698	671	948	365
162	984	482	537	547	925	493
859	939	277	974	925	196	995
397	439	649	629	838	999	594
784	732	372	589	338	343	249
			672	834	778	422
3121	4619	3081	5051	4153	4189	3118

8979	5722	7773	9934	7557
1999	4898	9929	2198	9929
8354	8982	8982	8846	2892
5869	3328	3928	2368	9388
6629	2432	2437	3287	2932
6342	4339	4834	3475	4839
38172	29701	37883	30108	37537

Review of Ones.

9646	94767		64333
2774	96373	75887	26667
6339	94932	38289	88448
4946	99138	97529	32492
6266	31272	12589	72725
5888	88858	28839	28999
2336	25283	83283	89299
4556	64548	74769	22829
			45649
42751	595171	411191	471441

88822	47388	98887
22287	84722	22933
82877	32232	93899
28237	97878	47222
72727	32252	75888
38377	78858	95288
32327	23233	55738
45457	54548	65288
411111	451111	56668
		611811

72689	83379	63962
98289	77782	47538
52889	33338	62677
68289	46797	48699
92889	64929	33865
28289	36188	75986
83989	54242	85892
22189	54867	25294
54229	42658	67458
573741	494180	511371

BUSY WORK.

All Combinations.

1.

(a)	(b)	(c)	(d)	(e)
43+7	11+9	34+5	45+3	42+5
16+6	45+5	47+2	36+2	11+6
29+9	34+4	15+4	23+6	19+7
47+7	42+2	31+8	41+7	47+9
58+8	77+7	43+6	18+9	32+4
13+3	26+6	12+7	23+4	11+5

2.

(a)	(b)	(c)	(d)	(e)
28+7	17+7	14+9	18+4	12+9
16+9	28+6	31+2	26+6	33+8
32+3	36+8	15+8	47+5	46+5
41+4	15+9	48+5	23+9	29+2
19+6	49+5	17+6	19+3	17+4
57+8	41+3	56+7	44+8	54+7

3.

4+6+3+7+8+2+1+9+5=	45
9+9+2+9+9+8+6+2+4=	58
1+1+2+4+2+6+6+2+4=	28
4+5+1+2+7+9+8+3+9=	48
20+3+5+8+2+2+1+7+2=	50
9+8+7+3+3+8+9+3+2+5=	57
41+6+3+7+9+4+2+4+4=	80
17+7+6+2+2+4+6+6+9+5=	64
16+7+2+8+7+8+5+2+8+7+6+7=	83
19+3+8+3+9+8+7+5+2+8=	72
16+6+8+9+3+8+5+7+2+8=	72
2+9+4+7+9+8+2+7+3=	51
3+8+8+2+7+3+4+6+9+6+5=	61

EXERCISES INVOLVING ALL THE COMBINATIONS.

1. Add together: Ten, fourteen, three hundred and six, one thousand and five, seventeen thousand two hundred and forty one. Ans. 18576. Write answer in words.

2. Add together: Nineteen, one hundred and three, forty thousand and six, twenty-seven. Ans. 40155. Write answer in words.

3. Add together: Three, forty-seven, eight hundred and two, twelve thousand four hundred. Ans. 13252. Write answer in words.

4. Find the sum of :

	Ans.
(a) 70, 304, 8, 19, 475, 2006, 37312.	40194
(b) 8, 10, 203, 47, 1005, 6243, 27800.	35316
(c) 4002, 105, 9, 10807, 243625, 100.	258648
(d) 100, 3769, 4, 81, 100243, 500069.	604266
(e) 27800, 96, 144, 3072, 80006, 50.	111168
(f) 425030, 5002, 87, 1693, 412, 873.	433097

Exercises Involving All Combinations.

5. The addends are :

432, 207, 869, 100, 423.

Find the sum.

6. The addends are : Ans. 2031.

789, 653, 425, 838, 724, 163.

Find the sum.

7. Find the sum of : Ans. 3592.

(a) $723+845+678+786+809+923+239$.

Ans. 5003.

(b) $1004+2506+3008+4572+6024+9009$.

Ans. 26123.

(c) $20006+10789+35460+40802+59996$.

Ans. 167053.

(d) $97843+87142+14287+42817+35467$.

Ans. 277556.

SUBTRACTION.

INTRODUCTION.

When teaching the tables in addition, the converse or the tables in subtraction have been taught *incidentally*. The method of treatment has been according to tables in the following progressive order: First, the table involving combinations of *ten*; then *nine*; then the table ending in *eight*; in *seven*; in *six*; in *five*; in *four*; in *three*; in *two*; in *one*.

In the table ending in *eight* the pupil is introduced into the intricacies of *borrowing*. Allow pupils to indicate the operation of borrowing and changing, until they have become proficient enough to do without. This *percept* is necessary to beginners. Indeed, with some pupils, the use of the slats helps to make the *bundle of ten* idea much clearer.

At end of table ending in *one* will be found review exercises on all the combinations.

Table Ending in "10."

10	10	10	10	10	10	10	10	10
5	6	4	7	3	8	2	9	1
—	—	—	—	—	—	—	—	—

Oral Exercise.

You have a *ten-cent* piece and you buy *one article*, say a top, for 5 cents; what change should you receive?

Money.	*1 Article.*	*Change.*
10-cent piece.....	6 cents.....	= 4 cents.
10-cent piece.....	7 cents.....	= ? .
10-cent piece.....	2 cents.....	= ? .
10-cent piece.....	8 cents.....	= ? .
10-cent piece.....	4 cents.....	= ? .

Money.	*2 Articles.*	*Change.*
10-cent piece...	costing 5 cents and 1 cent...	= 4 cents.
10-cent piece...	costing 3 cents and 3 cents..	= ? .
10-cent piece...	costing 5 cents and 5 cents..	= ? .
10-cent piece...	costing 6 cents and 3 cents..	= ? .
10-cent piece...	costing 7 cents and 2 cents..	= ? .
10-cent piece...	costing 4 cents and 3 cents..	= ? .
10 cent piece...	costing 2 cents and 1 cent ..	= ? .
10-cent piece...	costing 3 cents and 5 cents..	= ? .
10-cent piece...	costing 5 cents and 4 cents..	= ? .

Table Ending in "9."

Oral Exercise.

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

Written Exercise.

9 – 8 = ; 9 – ? = 8; 9 – 9 = ; 9 – 0 = .

(1)

999,999,999
181,089,818
818,910,181

(2)

[illegible]

9 – 7 = ; 9 – 2 = ; 9 – = 7; 9 – = 2.

(3)

9,999,999
7,272,277
2,727,722

(4)

99,999,999
29,078,217
70,921,[illegible]

(5)

999,999,999
182,709,277
817,290,722

9−6= ; 9−3= ; 9− =6; 9− =3.

(6)	(7)
999,999,999	999,999,999
363.633,666	609,182,736
636,666,333	390,817,263

(8)
999,999,999
871,263.390
128.736.609

9−5= ; 9−4= ; 9− =4; 9− =5.

(9)	(10)	(11)
999,999,999	999,999,999	999,999,999
445,554,455	549,036,721	985,476,305
554,445,544	450,963.278	014,523 694

(12)	(13)	(14)	(15)	(16)	(17)	(18)
109	109	109	109	109	109	109
81	18	27	36	72	45	90
28	91	82	73	37	64	19

(19)	(20)	(21)	(22)	(23)	(24)	(25)
109	109	109	109	109	109	109
82	19	73	42	58	64	71
27	90	36	67	51	45	38

(26)	(27)	(28)	(29)
109,999	109,999	109,999	109,999
55,392	46,817	39,081	82,468
54,607	63,182	70,918	27,531

Table Ending in "8."

Oral Exercise.

8	8	8	8	8	8	8	8	8	18
1	7	8	0	4	2	6	5	3	9
—	—	—	—	—	—	—	—	—	—

Written Exercise.

8−1= ; 8−7= ; 8− =7; 8− =1;
8−8= ; 8−0= .

(1)

888,888,888
111,777,177
777,111,711

(2)

888,888,888
717,718,008
171,170,880

Borrowing.

(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
90	90	90	90	90	90	90	90
15	19	14	72	78	76	13	17
—	—	—	—	—	—	—	—
75	71	76	18	12	14	77	73
—	—	—	—	—	—	—	—

(11)	(12)	(13)	(14)
990	9,990	99,990	999,990
573	1,608	32,489	892,506
417	8,382	67,501	107,484

(15)	(16)	(17)	(18)
1,090	1,090	1,090	1,090
513	485	906	277
577	605	184	813

(19)

10,990
4,874
6,116

(20)

109,990
57,176
52,814

(21)
109,999,990
53,740,382
56,259,608

8−4= ; 8−2= ; 8−6= ; 8−5= ;
8−3= ; 8− =3.

(22)
888,888,888
266,624,244
622,264,644

(23)
888,888,888,888
470,812,633,355
418,076,255,533

(24)
888,890
673,427
215,463

(25)
988,890
356,342
632,548

(26)
108,889,839,890
84,809,524,635
24,080,375,255

18−9= ; 18− =9.

(27)
188
94
94

(28)
188,888
92,486
96,402

(29)
188,888,888
91,753,064
97,135,824

(30)
188,996,998,890
98,524,687.234
90,374,311,656

(31)
189,888,896,890
92,172,038,432
97,716,860,458

Consecutive Borrowing.

(32)	(33)	(34)	(35)	(36)	(37)
990	990	990	990	990	990
195	292	399	467	693	598
795	698	591	523	297	39[illegible]

(38)	(39)	(40)	(41)	(42)	(43)
190	190	190	190	190	190
96	95	91	98	94	97
94	[illegible]5	99	92	96	93

(44)	(45)	(46)
9,998	99,990	9,999,990
2,999	49,996	5,999,995
6,999	49,994	3,999,995

(47)	(48)	(49)
919,918	919,910	9,199,118
359,929	739,956	[illegible]599,439
[illegible]59 989	179,954	5,599,679

(50)	(51)	(52)
908	9,008	9,900,000,008
489	2,329	4,959,038,429
419	6 679	4,940,961,579

(53)	(54)	(55)	(56)
19,900,000,018	190,000,000	1,000,018	1,000,008
9,957,209,349	94,982,537	634,529	457,939
9,942,790,669	95,017,463	365,489	542,069

Table Ending in "7."

Oral Exercise.

7	7	7	7	7	7	7	7	17	17
1	6	7	0	5	2	4	3	8	9
—	—	—	—	—	—	—	—	—	—

Written Exercise.

7 − 1 = ; 7 − ? = 1; 7 − 7 = ; 7 − 0 = .

(1)
777,777,777
610,776,611
167,001,166

(2)
777,777,777
116,610,761
661,167,016

7 − 5 = ; 7 − 2 = ; 7 − ? = 2; 7 − = 5.

(3)
777,777,777
525,222,555
252,555,222

(4)
777,777,777,777
616,167,700,525
161,610,077,252

7 − 4 = ; 7 − 3 = ; 7 − = 3; 7 − = 4.

(5)
777,777,777
433,444,334
344,333,443

(6)
7,777,777,777,777
2,076,122,554,334
5,701,655,223,443

17 − 8 = ; 17 − 9 = ; 17 − ? = 9; 17 − = 8.

(7)
177
84
93

(8)
1,777
923
854

(9)
17,777
8,765
9,012

(10)
87
39
48

(11)
87
28
59

(12)
88,887
39,988
48,899

(13)
1,777,788,887
952.438,899
825,349,988

(14)
1,778,887,777
824,989,073
953,898,704

(15)
81,780,888,187
35,934,594,789
45,846,293,398

(16)
1,789,800,018,000
824,589,249.327
965,210,768,673

Table Ending in "6."

ORAL EXERCISE.

6	6	6	6	6	6	6	16	16	16
1	5	6	0	3	2	4	8	9	7
—	—	—	—	—	—	—	—	—	—

WRITTEN EXERCISE.

6 − 1 = ; 6 − 5 = ; 6 − 6 = ; 6 − 0 = ;
6 − = 1 ; 6 − = 5 ; 6 − = 0.

(1)
666,666,666,666
510,066,555,111
156,600,111,555

6 − 3 = ; 6 − 2 = ; 6 − 4 = ;
6 − = 4 ; 6 − = 2.

(2)
666,666,666,666
423,442,233,243
243,224,433,423

(3)
666,666,666,666
432,516,006,132
234,150,660,534

16 − 8 = .

(4)
166
83
83

(5)
166,666,666
84,235,601
82,431,065

(6)	(7)	(8)	(9)
76	76	16,666,676	777,776
38	48	8,423,518	188,888
38	28	8,243,158	588,888

16 − 9 = ; 16 − 7 = .

(10)	(11)	(12)	(13)	(14)
166	76	76	17,776	1,777,776
94	39	27	7,979	897,798
72	37	49	9,797	879,978

(15)	(16)	(17)
1,778,776	76,716,987,716	11,877,767,996
829,798	27,328,544,749	4,983,793,998
948.978	49.388,442.967	6,893,973,998

(18)	(19)
17,897,017,006	177,879,010,000
8,423,858,439	98,989,254,367
9,473,158,567	78,889.755,633

Table Ending in "5."

Oral Exercise.

5	5	5	5	5	5	15	15	15	15
1	4	5	0	3	2	9	6	8	7

Written Exercise.

5 − 1 = ; 5 − 4 = ; 5 − 5 = ; 5 − 0 = ;
5 − 3 = ; 5 − 2 = .

(1)	(2)
555,555,555	589,955,688,976,555
223,340,511	124.305,254,223,342
332,215,044	465,650,434,753,213

15 − 9 = ; 15 − 6 = ; 15 − = 9; 15 − = 6.

(3)	(4)	(5)	(6)
665	6,665	66,565	6,666,665
329	4,516	24,639	3,966,969
336	2,149	41,926	2,699,696

15 − 8 = ; 15 − 7 = ; 15 − = 7; 15 − = 8.

(7)	(8)	(9)	(10)	(11)
665	665	665	566,665	665,605
288	177	378	438,769	187,229
377	488	287	127,896	478,376

(12)	(13)
6,166,560,005	19,887,776,665
3,273,638,238	9,898,979,687
2,892,921,767	9,988,796,978

(14)	(15)	(16)
601,005	1,590,005	9,658,017
238,326	632,538	2,864,539
362,679	957,467	6,793,478

(17)	(18)	(19)
7,689,010	866,010,015	15,601,000
3,889,245	497,542,348	7,342,643
3,799,765	368,467,667	8,258,357

Table Ending in "4."

Oral Exercise.

4	4	4	4	4	14	14	14	14	14
1	3	4	0	2	5	9	7	6	8
—	—	—	—	—	—	—	—	—	—

Written Exercise.

4 − 1 = ; 4 − 3 = ; 4 − 4 = ;
4 − 0 = ; 4 − 2 = .

(1)
444,444,444
204,032,231
240,412,213

(2)
894,787,656,444
452,234,130,241
442,553,526,203

14 − 5 = ; 14 − 9 = ; 14 − = 9; 14 − = 5.

(3)
5,454,454
1.535,325
3,919,129

(4)
5,445,554
3,523,555
1,921,999

(5)
5,454,454
1.939,329
3.515,125

(6)
5,445,554
3,923,999
1,521,555

(7)
4,455,554
2,325,995
2,129 559

(8)
445,445,554
312,923,959
132,521.595

(9)
557,799,764
258,454,979
299,344,785

(10)
5,005,095,458
2,543,439.509
2.461,655,949

14 − 7 = .

(11)
55,545,454
27,774,727
27,770,727

(12)
14,795,004
5.429.237
9,365,767

(13)
967,885.554
579.892.957
387.992,597

14 − 6 = ; 14 − 8 = ; 14 − = 8 ; 14 − = 6.

(14)

5,454,454
1,636,326
3,818,128

(15)

5,445,554
3,623,666
1,821,888

(16)

5,445,554
3,823,888
1,621,666

(17)

445,445,554
312,823,868
132,621,686

(18)

555,545,554
286,862,597
268,682,957

(19)

1,447,879,004
830,379,426
617,499,578

Table Ending in "3."

Oral Exercise.

3	3	3	3	13	13	13	13	13	13
1	2	3	0	9	4	8	5	7	6
—	—	—	—	—	—	—	—	—	—

Written Exercise.

3 − 1 = ; 3 − 2 = ; 3 − 3 = ; 3 − 0 = ;
13 − 9 = ; 13 − 4 = .

(1)

4,433,333
1,990,321
2,443,012

(2)

343,333,443
129,230,299
214,103,144

(3)

343,344,443
119,319,999
224,024,444

(4)

434,434,343
141,440,434
292,993,909

(5)
443,444,443
149,121,994
294,322,449

(6)
434,434,443
291,442,994
142,991,449

(7)
130,754,003
40 384,759
90,369,244

13 − 8 = ; 13 − 5 = .

(8)
4 443
2,888
1,555

(9)
444,334,443
288,830,888
155,503,555

(10)
144,433
95,851
48,582

(11)
14,443,333
5,984,032
8,459,301

(12)
1,839,448
894,859
944,589

13 − 7 = ; 13 − 6 = ; 13 − = 7 ; 13 − = 6

(13)
444,443
167,667
276,776

(14)
1,354,443
726,078
628,365

(15)
14,444,005
4,867,236
9,576,769

(16)
197,944,013
98,476,327
99,467,686

(17)
14,045,764,340
6,426,380,734
7,619,383,606

(18)
1,400,434,433
635,071,893
765,362,540

(19)

1,378,401,304,003
622,125,703,524

756,275,600,479

(20)

144,543,577,998
76,294,348,349

68,249,229,649

Table Ending in "2."

Oral Exercise.

2	2	2	12	12	12	12	12	12	12
1	2	0	6	3	9	4	8	5	7
—	—	—	—	—	—	—	—	—	—

Written Exercise.

2 − 1 = ; 2 − 2 = ; 2 − 0 = .

(1)

222,222,222
100,222,111

122,000,111

12 − 6 = ; 12 − = 6.

(2)

3,223,332
1,612,666

1,610,666

(3)

3,323,332
1,660,666

1,662,666

12 − 3 = ; 12 − 9 = ; 12 − = 9; 12 − = 3.

(4)

3,222,333,332
1,602,133,333

1,620,199,999

(5)

143,203,332,332
79,902,966,193

63,300,366,139

12 − 4 = ; 12 − 8 = ; 12 − = 4; 12 − = 8.

(6)

133,323,233,332
89,342,618,844

43,980,614,488

(7)

233,323,202,232
126,431,400,128

106,891,802,104

12−5= ; 12−7= ; 12− =5; 12− =7.

(8)
123,323,332
72,771,555
50,551,777

(9)
12,233,332
7,015,757
5,217,575

(10)
33,333,332
16,758,493
16,574,839

(11)
333,333,332
158,673,649
174,659,683

(12)
13,483,002,812
7,791,936,324
5,691,066,488

(13)
432,833,383,000
17,339,725,924
415,493,657,076

(14)
512,932,054,434
25,135,019,166
487,797,035,268

(15)
833,432,963,802
545,637,598,346
287,795,365,456

Table Ending in "1."

Oral Exercise.

1	1	11	11	11	11	11	11	11	11
1	0	2	9	3	8	4	7	5	6
—	—	—	—	—	—	—	—	—	—

Written Exercise.

1−1= ; 1−0= ; 11−2= ; 11−9= ;
11−3= ; 11−8= ; 11− =2; 11− =3;
11− =9; 11− =8.

(1)
122,221,111
83,922,101
38,299,010

(2)
21,222,221
3,199,283
18,022,938

11 − 4 = ; 11 − 7 = ; 11 − = 4 ; 11 − = 7.

(3)	(4)
11,222,221	1,112,222,221
7,177,444	401,987,324
4 044,777	710,234,897

11 − 5 = ; 11 − 6 = ; 11 − = 5 ; 11 − = 6.

(5)	(6)
12,221,221	122,210,121
5,655,165	57,650,016
6,566,056	64,560,105

(7)	(8)
1,222,222,221	222,222,221
965,748,392	182,463,597
256,473,829	39,758,624

(9)	(10)
722,863,223,001	13,010,602,700 101
34,872,529,248	9,250,223,723,654
687,990,693,753	3,760,378,976 447

Review Work on any Combination.

EXERCISE 1.

(1)	(2)
80,008	180,009
31,243	93,524
48,765	86,485

(3)	(4)	(5)
1,000,000	1,000,000	1,000,000,103
293,784	467,312	101,092,028
706,216	532,688	898,908,075

Exercise II.

(1)

8,000,000,101
2,080,109,173

5,919,890,928

(2)

484,030,298,046
128,910,012,031

355,120,286,015

(3)

840,000,364,201
120,731,892,109

719,268,472,092

(4)

430,790,010,112
124,730,913,871

306,059,096,241

(5)

3,000,801,800,103
1,287,121,073,109

1,713,680,726,994

PROBLEMS.

◆◆◆◆◆◆

Exercise I.

Find the sum of .

1. 150, 23, 47, 8 and 31. [Ans. 259.]
2. Thirty-six ; Forty-eight ; Twenty ; Fifty-nine ; Three. [Ans. 166.]
3. One hundred and twenty-one ; Three hundred and eight ; Seventy-nine ; One hundred and fifteen. [Ans. 623.]
4. The *odd* numbers between 2 and 12. [Ans. 35.]
5. The *even* numbers between 1 and 11. [Ans. 30.]

Exercise II.

Find the value of :

1. 19−3+6+8−5+17−14. [Ans. 28.]
2. 84−13−27+76−41+12. [Ans. 91.]
3. 12+16−15+97−34−29. [Ans. 47.]
4. 76−39+98+84−25−23. [Ans. 171.]
5. 274+153−326+282−108. [Ans. 275.]

Exercise III.

1. What number must I *add* to 84 to make 113? [Ans. 29.]
2. What number must I add to 538 to make nine hundred and nine? [Ans. 371.]
3. What number must I add to four hundred and seven to make 1,074? [Ans. 667.]
4. What number must I add to five thousand and seventy to make ten thousand? [Ans. 4,930.]
5. What number must I add to seventy-one thousand three hundred and one to make 100,000? Write answer in words. [Ans. Twenty-eight thousand six hundred and ninety-nine.]

Exercise IV.

1. What number must I *take* from 121 to make 34? [Ans. 87.]

2. What number must I take from 5,372 to make two thousand one hundred and seventy-six? [Ans. 3,196.]

3. What number must I take from thirty-eight thousand and six to make 18,439? [Ans. 19,567.]

4. What number must I take from one million to make seven hundred and forty-two thousand and eighty-one? [Ans. 257,919.]

5. What number must I take from one million and one to make eight hundred thousand and two? Write answer in words. [Ans. One hundred and ninety-nine thousand nine hundred and ninety-nine.]

Exercise V.

1. Take the sum of 56 and 93 from 618. [Ans. 469.]

2. Take the sum of 382 and 296 from one thousand and one. [Ans. 323.]

3. Take the sum of all the numbers between 18 and 24 from three hundred. [Ans. 195.]

4. Take the sum of all the numbers ending in "2" between 30 and 70 from 286. [Ans. 98.]

5. Take the sum of one hundred and one; two hundred and ninety; fifteen; four hundred and eighty, from 1,000, and write answer in words. [Ans. One hundred and fourteen.]

Exercise VI.

1. From the sum of 493 and 197 take the difference between these two numbers. [Ans. 394.]

2. From the sum of six thousand and six and 2,914 take the difference between these two numbers. [Ans. 5,828.]

3. From the sum of 4,005 and two thousand three hundred and twenty take the difference between these two numbers. [Ans. 4,640.]

4. From the sum of 42,619 and 6,235 take the difference between 9,307 and 3,128. [Ans. 42,675.]

5. From 58,642+17,939 take the difference between them. [Ans. 35,878.]

Exercise VII.

1. How much *less* is 293 than 621? [Ans. 328.]
2. How much *less* is 2,004 than 29.001? [Ans. 26,997.]
3. How much *greater* is 856 than 389? [Ans. 467.]
4. How much *greater* is ten thousand than 3,004? [Ans. 6,996.]
5. How *many more* in ten thousand than in two thousand and two? [Ans. 7,998.]

Exercise VIII.

1. Take 5,796,337 from 8,375,420. [Ans. 2,579,083.]
2. Find the difference between 3,421,008,001 and 1,301.643,927. [Ans. 2,119 364,074.]
3. From two thousand five hundred and four take 1,897. Write answer in words. [Ans Six hundred and seven.]
4. Add 68 to the difference between 1,123 and 249. [Ans. 942.]
5. Find the difference between 847 and 468 and to the *remainder add* one hundred. [Ans. 479.]

Exercise IX.

1. The addends are:—

Eight hundred and four; four hundred and five; five thousand nine hundred and fourteen; seven thousand and thirty-six.

Find their *sum* and take it from one hundred thousand [Ans. 85,841.]

2. Find the result of 2,453+7,305−4.379. [Ans. 5,379]
3. Find the result of 2,742−1,006+2,135. [Ans. 3,871.]
4. Begin at 182 and subtract by 3's as far as possible. [Ans. 182; 179; 176, etc.]
5. Begin at 101 and subtract by 6's as far as possible. [Ans. 101; 95; 89, etc.]

Exercise X.

1. Subtract 215 from 691. [Ans. 476.]
2. Subtract 135 from 225+882. [Ans. 972.]
3. The minuend is 2.040 and the subtrahend is 1,191. Find the remainder. [Ans. 849.]
4. The minuend is 1,763 and the subtrahend is 984. What is the difference? [Ans. 779.]
5. From 40,263 take 12,[illegible]7 and from the *remainder* *take* 10,424. [Ans. 17,272

Exercise XI.

1. How many days altogether in the three months, March, April and May? Give your answer in words; also in Roman numerals. [Ans. Ninety-two days; XCII.]
2. How many days in the *summer* mo[illegible]? In the *autumn* months? Give the *sum* of the two answers in *Roman* numerals. [Ans. CLXXXIII.]
3. Add 25 cents; 33 cents; 82 cents; 10 cents; 8 cents; 18 cents; 50 cents. [Ans. $2.26.]
4. Add $1.25; $3.05; $[illegible]; 75 cents; $5.08; $0.03. [Ans. $12.16.]
5. Out of a ten dollar bill a farmer spent $7.08. What money had he left? [Ans. $2.92.]

Exercise XII.

1. Make the *largest* number that can be made from the three figures 1, 5 and 9; and from it take 237. [Ans. 714.]
2. Make the *smallest* number that can be made from the figures 8, 0, 4 and 6; and from it take 189. [Ans. 279.]
3. From the *largest* number that can be made from the figures 4, 5 and 3 take the smallest number that can be made from the same figures. [Ans. 198.]
4. Take the *smallest* number to be made from the figures 2, 9 and 1 from the *largest* number to be made from the figures 1, 6 and 3. [Ans. 502.]

5. Subtract the *largest* number to be made from the figures 9, 0, 2 and 5 from ten thousand and one. [Ans. 481.]

Exercise XIII.

1. John had read in his Reader as far as lesson XXXIV. Write this in figures. [Ans. 34.]

2. Write in *Roman numerals:* 18; 13; 49; 81; 100; 22. [Ans. XVIII.; XIII.; XLIX.; LXXXI.; C.; XXII.]

3. Write in *figures:* XLIII.; LXVIII.; CIV.; XCIX.; M.; DCCXXXI. [Ans. 43; 68; 104; 99; 1000; 731.]

4. I had three *Roman coins* on which were these dates: DLV.; CCVIII.; CDX. Write in *figures.* [Ans. 555; 208; 410.]

5. In these books I saw these dates:

Andersen's Fairy Tales.....DCCCXL.;
Robinson Crusoe .....CMLXXXVIII.

Write in *figures.* [Ans. 840; 988.]

Exercise XIV.

1. Sam's father gave him for a Xmas present 5 ten-cent pieces. He spent 25 cents on a book for his sister and 11 cents on marbles. How much had he left? [Ans. 14 cents.]

2. Tom had a dollar bill and he gave his 2 brothers 30 cents each. How much had he left? [Ans. 40 cents.]

3. How much would I have left out of a *two dollar* bill if I gave 50 cents for a knife, 15 cents for a ball and 10 cents for a slate? [Ans. $1.25.]

4. A boy had $5; his sister $6; his mother $50 and his father $100. How much money had they altogether? [Ans. $161.]

5. Fanny had 75 cents. She gave her brother 25 cents and her sister 15 cents. How much had she left for herself? [Ans. 35 cents.]

Exercise XV.

1. Willie's brother is 15 years old; how much longer must he live to be 27 years of age? [Ans. 12 years.]

2. Jennie had 17 marks less in her examination than her friend Annie, who had 94 marks. How many marks had Jennie? [Ans. 77 marks.]

3. Our school had 23 boys and 29 girls on opening day; but after a week 8 girls *more* came and 2 boys *left* to go to work How many scholars are in the school? [Ans. 58 scholars.]

4. John was born in 1875 and lived till 1894. How old was he? [Ans. 19 years.]

5. Charlie's mother had an old book of fairy tales, which was given to her in the year 1854. She gave it away in the year 1883. How long had she the book? [Ans. 29 years.]

Exercise XVI.

1. A room is 16 feet wide and 24 feet wide. What is the distance around it? [Ans. 80 feet.]

2. James had 75 marbles. His uncle gave him 19 more. Then James gave his cousin 27. How many has James left for himself? [Ans. 67 marbles.]

3. Tom's father bought a house and lot for $4,750. The house cost $3,065. What did the lot cost? [Ans. $1,685.]

4. The hall in May's house is 4 feet wide and 18 feet long. How many feet will May walk to go around the hall once? [Ans. 44 feet.]

5. The cloth on our teacher's table is 2 feet wide and 5 feet long. How many feet of fringe will it take for trimming? [Ans. 14 feet.]

Exercise XVII.

1. George was practising at pitching the ball. He threw it 19 feet. How far will he have to walk to go and get the ball and return to the place where he started throwing? [Ans. 38 feet.]

2. Charles was in the orchard and he threw an apple 13 feet to his *right*, and another apple 15 feet to his *left*. How many feet apart were the apples? [Ans. 28 feet.]

3. A boy slings a stone 35 feet *up* the road and another stone 29 feet *down* the road. How far apart are the two stones? [Ans. 64 feet.]

4 Mr. Smith lives 98 miles *east* of Toronto, and Mr. Brown lives 47 miles *west* of Toronto. How far apart do they live? [Ans. 145 miles.]

5. Edith lived 176 yards *north* of the school and Mabel lived 228 yards *south* of the school. How much nearer the school did Edith live? [Ans. 52 yards.]

Exercise XVIII.

1. Maggie and Ettie picked 123 pints of berries in the holidays; if Maggie picked 79 pints, how may pints did Ettie pick? [Ans. 44 pints.]

2. Annie's Sunday School prize book has 463 pages in it. She has read 189 pages. How many has she still left to read? [Ans. 274 pages.]

3. In an orchard there were 58 *more* apple trees than peach trees. There were 113 peach trees. How many trees altogether in the orchard? [Ans. 284 trees.]

4. A farmer had 250 sheep. He sold 115 to a butcher and 17 of the others took sick and died: How many had he left? [Ans. 118 sheep.]

5. Fred is making a collection of stamps. He has 57 now. How many more must he get to have 123? [Ans. 66 stamps.]

Exercise XIX.

1. Dr. Brown left his office and rode 7 miles to see a little boy who had hurt his foot. Then he *returned to his office* and went out again, riding 12 miles to a sick man. After returning to his office the second time how many miles had the doctor ridden altogether? And how much is it less than 50 miles? [Ans. 38 miles; 12 miles.]

2. A newsboy buys 35 papers on Monday, 47 on Tuesday, 59 on Wednesday, 61 on Thursday, 70 on Friday and 83 on Saturday. How many papers did he sell that week if he sold all but 18? [Ans. 337 papers.]

3. In a box of chestnuts there were five hundred and eleven nuts. Frank took 123 out and his sister took out

34 *less* than he did. How many were left in the box? [Ans. 299 chestnuts.]

4. Jim drives the cows twice a day to be milked. How many times will he have driven them in the *summer* months? [Ans. 184 times.]

5. In what year was a man born who died in 1871 at the age of 94? [Ans. In 1777.]

Exercise XX.

1. A grocer has three boxes filled with eggs; the first contains 2,007; the second contains 128 less than the first; and the third contains as many as the first and second together less 9. How many eggs in the three boxes? [Ans. 7,763 eggs.]

2. Tom had 415 marbles, his aunt gave him 29 less than 227, then he gave his brother Jack and his cousin Bert 158 each. How many had Tom left? [Ans. 297 marbles.]

3. A bicycle dealer owes $1,850; if he had $8 less than $600 he could pay all he owes. How much money has he? [Ans. $1,258.]

4. A man bought a farm for $8,790; he spent $538 for new sheds and $897 for cattle. He then sold out the whole for $12,000. Did he gain or lose, and how much? [Ans. $1,775 gain.]

5. Mr. and Mrs. King and their two children, Fred and Maud, got weighed. Mr. King weighed 150 pounds more than his daughter; Mrs. King weighed 108 pounds less than Mr. King; Fred weighed 42 pounds more than his mother; Maud weighed 97 pounds. What did the others weigh, and how much did the whole family weigh altogether? [Ans. Mr. King 247 pounds; Mrs. King 139 pounds; Fred 181 pounds; whole family 664 pounds.]

Exercise XXI.

1. Mr. Brown, a farmer, had $1,225.75 in the Bank of Commerce. He drew out eighty-five dollars to buy a bicycle for his son John. In a week, Mr. Brown put in the bank three hundred dollars and sixty-five cents. He drew out again ninety dollars and sixteen cents for re-

pairing his barn. How much had he left in the bank? [Ans. $1,351.24.]

2. William, Fred and John are three brothers. Their father died leaving his money willed to them in this way: William was to receive $11,985; Fred, one hundred and eighty-nine dollars less than William; and the sum of William's and Fred's money less nine thousand and eighty-four dollars was what John was to receive. What was Fred to receive? What was John to receive? What was their father worth? [Ans. Fred, $11,796; John, $14,697; Father was worth $38,478.]

3. A man bought a house and ground for $9,265; he built an extension to the house which cost him $1,836. The house was then destroyed by fire and he received three thousand seven hundred and five dollars from the insurance company. How much did he lose? [Ans. $7,396.]

4. A man had four money boxes. He put two thousand five hundred and six dollars in the first box; one thousand nine hundred and eighteen dollars in the second box. In the third box he put as much as in the first and second together. How much was in the fourth box, supposing he was worth ten thousand dollars? [Ans. $1,152.]

5. A wholesale tea merchant buys six thousand and sixty pounds of tea. He has four chests to put it in. The first holds one thousand and ten pounds; the second holds one hundred and one pounds less than the first: the third holds as much as the first and second less ninety pounds. How much must the fourth hold? [Ans. 2,312 pounds.]

Exercise XXII.

1. John Porter owed James Smith $8,000 less $179. He paid his debt by giving some property and two thousand eight hundred and fifty three dollars in cash. How much was the property supposed to be worth? [Ans. $4,968.]

2. I purchased a house, paying eight thousand dollars. I then spent one hundred and eighteen dollars less than six hundred dollars in improvements; after this I decided to sell. Mr. Clark bought from me for nine thousand and fifty dollars How much did I make? [Ans. $568.]

3. William has $201.63; John has $13.49 less than William and $9.39 more than James. Fred has as much as John and James together. How much money has Fred? [Ans. $366.89.]

4. James Robertson, hardware merchant, had at the beginning of the day $648.25 in his safe; he received during the day $237.19; he paid out the same day $30 less 11 cents. How much cash had he in his safe at the end of the day? [Ans. $855.55.]

5. A bicycle dealer received during the day $510. He paid out during the day the sum of $18.19 and $13.08. What did he make that day? [Ans. $478.73.]

Exercise XXIII.

1. Mr. Thompson has $175 worth of poultry. He sold them so as to make $20 less 91 cents; what was the selling price of the poultry? [Ans. $194.09.]

2. An exhibition is visited by ten thousand two hundred and fifty-one persons on Monday; nine thousand and six persons on Tuesday; 3,984 persons on Wednesday; the difference between Monday and Wednesday will give the number who attended on Thursday; the sum of Tuesday and Thursday will give the number who attended Friday. On Saturday there were ninety persons less in attendance than on Friday. How many persons visited the exhibition on Saturday? [Ans. 15,174 persons.]

3. A man owing two thousand dollars less three hundred and three dollars paid at one time eleven dolllars less than eight hundred dollars, and at another time five hundred doliars. How much does he still owe? [Ans. $408.]

4. A man who owes fifteen hundred dollars paid at one time three hundred and one dollars; and at another time the difference between $826 and $349; and the third time he paid the remainder. How much did he pay the third time? [Ans. $722.]

5. A man bought a farm for $6,987; he spent two thousand and twenty dollars for improvements and three hundred dollars for stock. He then sold the whole for nine thousand two hundred and fifty dollars; did he gain or lose, and how much? [Ans. He lost $57.]

Exercise XXIV.

1. A farmer's horses, cattle and sheep number nineteen less than one hundred and fifty. He has 15 horses; 68 more cattle than horses. How many sheep has he? [Ans. 33 sheep.]

2. A man who had to collect money from four men received altogether $1,639; from the first he got four hundred and fifty-eight dollars; from the second sixty-nine dollars more, and from the third ninety-three dollars less than this. How much did he receive from the fourth? [Ans. $289.]

3. A span of horses weigh 2,475 pounds. One weighs the sum of 618 and 689 pounds. What does the other weigh? Write answer in words, also in Roman numerals. [Ans. 1,168 pounds; one thousand one hundred and sixty eight; MCLXVIII.]

4. The population of three towns is as follows: The first is nineteen thousand three hundred and eighty-five; the second is one thousand and nineteen less than the first; and the third is nine hundred and eighty-nine less than the second. What is the population of the third town? [Ans. 17,377.]

5. John Reid bought of Thomas Gibson 923 acres of land for twenty-five thousand dollars. For 416 acres he paid thirteen thousand three hundred and seventy-one dollars. How many acres were in the remainder? And what money did it cost? [Ans. 507 acres; $11,629.]

Exercise XXV.

1. A farmer bought two hundred and fifty cows for five thousand three hundred and thirty dollars. He fed them for one year at an expense of $2,000 less fifty dollars, and then sold the entire herd for six thousand one hundred and ninety-nine dollars. How much did he gain or lose? [Ans. He lost $108.]

2. A drover bought one hundred and ninety-three sheep at $965. It cost $120 to get them to market. Eight sheep died on the way, which was a loss of $40. He sold the remainder for $1,480. What did he gain? [Ans. $355 gain.]

3. A harvest workman earned $79 by working a certain number of days He bought a coat which cost $11.69 ; a railway ticket which cost $4.85 ; and a pair of boots for $3.50. What had he left to spend after putting $25.00 in the bank ? [Ans. $33.96.]

4. There were two candidates in an election. The whole number of votes was two thousand four hundred and eighty-six. The defeated person got nine hundred and two votes ; what was the majority ? [Ans. 682.]

5. A man bought a steamer for thirty thousand dollars. He paid $12,695 in cash, and $3.898 less in goods. The remainder he gave in property. What was the land worth? [Ans. $8,508.]

Exercise XXVI.

1. In a battle the number of soldiers in the regiments was ten thousand and eighty ; of these 419 were killed ; six hundred less twenty-three were wounded. How many uninjured remained ? [Ans. 9,084.]

2. I sold my house for $6,550 ; my furniture for $4,-050 less than my house ; my barn and contents for $750 more than my furniture. How much cash did I receive ? Write answer in words. [Ans. Twelve thousand three hundred dollars.]

3. Frank White decided to sell his farm. The auctioneer's charges were five dollars and three cents. The lawyer's expenses were fifteen dollars and sixty-nine cents. How much did he receive if the farm sold for seven thousand dollars less twenty-three dollars ? [Ans. $6,956.28.]

4. A man who put his money into gold mines gained $6,395. But the next day he lost $127 + $396. In a few months, however, he made three thousand and ten dollars and immediately lost two hundred and five dollars. How much more did he gain than lose on the whole ? [Ans. $8,677.]

5. A man bought five houses for twenty thousand dollars. For the first he paid $250 more than for the second, but $330 less than for the third, for which he paid $4,308. The fifth cost him $789 less than the third. How much did he pay for the fourth house ? [Ans. $4,467.]

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