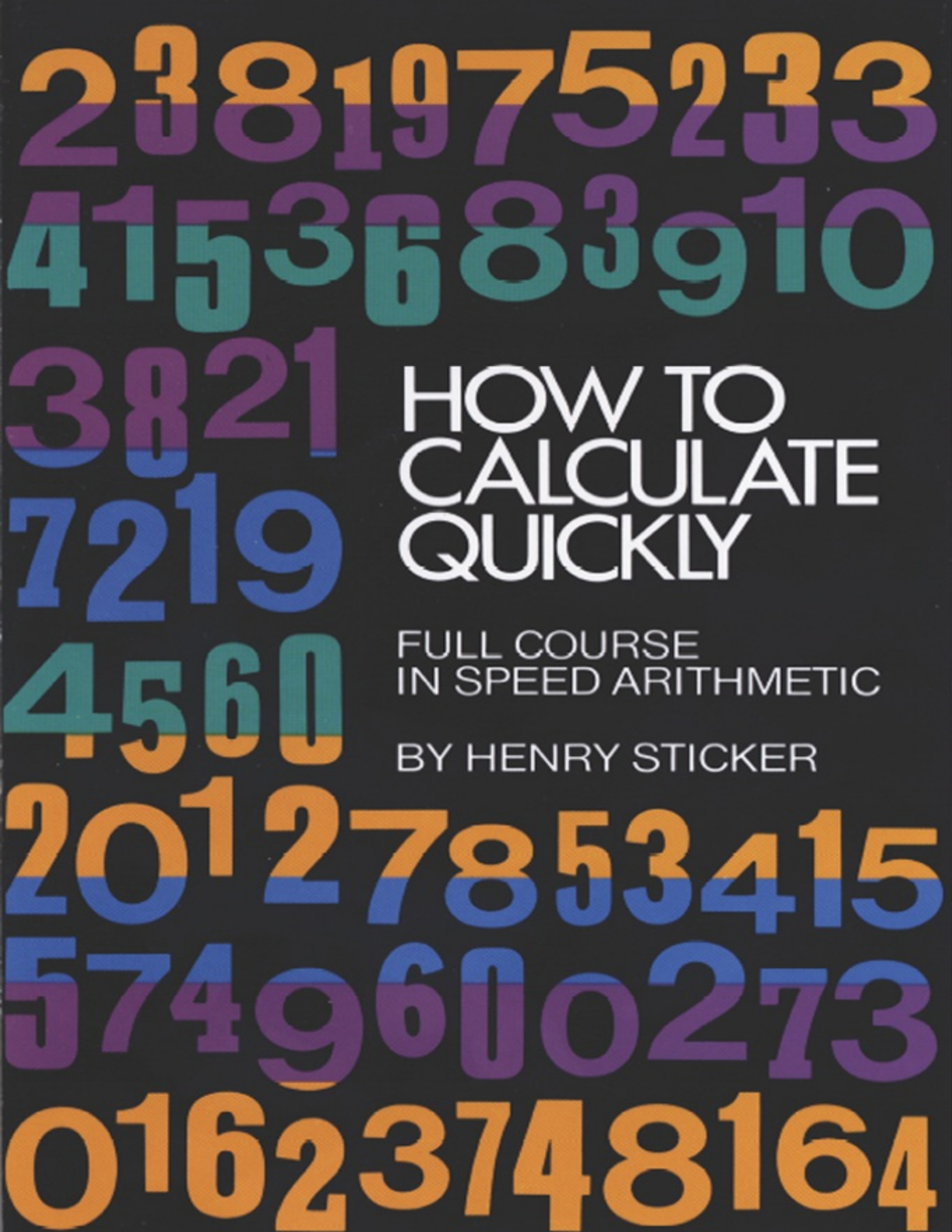
HOW TO CALCULATE QUICKLY
FULL COURSE IN SPEED ARITHMETIC
BY HENRY STICKER

HOW TO CALCULATE QUICKLY

(the art of calculation)

BY HENRY STICKER

DOVER PUBLICATIONS, INC.

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PREFACE

Arithmetic is a science, but calculation is an art. Science is knowledge—art is skill. You have all the knowledge you could possibly need to determine that 57 times 25 equals 1425, but if you are asked to multiply 57 by 25 and cannot do this mentally in just about one second, you are not adept at the art of calculation.

Genuine skill in the calculating art can be acquired by any person of ordinary intelligence, no matter what his schooling may have been. To develop such skill is the purpose of this book. Special forms of short, graded exercises, performed for the most part mentally, lead the student by easy steps to a point where he will possess really exceptional calculating ability.

For instance, if you will look at Exercise No. 371 on page 191, you will find that you are expected to perform mentally such multiplications as 696 times 858, 858 times 878, etc. These are not "trick" examples—the student who systematically performs the practice examples presented in this book will be able to do many kinds of examples of this degree of difficulty by his sheer ability to hold and manipulate figures *in his head.*

How is this skill developed? Essentially by developing *number sense.* Number sense consists in the ability to recognize the relations that exist between numbers considered as whole quantities, and to work with the thought of their broad relations always uppermost. Number sense is possessed by many people in all walks of life—particularly by accountants, bookkeepers, estimators, cashiers, storekeepers and the like. On the other hand, it is absent in many who have an excellent understanding of advanced mathematics. The engineering professions are full of those who require slide rules to perform calculations which the average billing clerk would do mentally.

To give an example of what is meant by number sense, suppose you were asked to multiply mentally 11625 by 12. If you felt at all competent to try to do so, you would probably (unless you are the exceptional case) proceed like this: 12 times 5 is 60, remember 0 and carry 6; 12 times 2 is 24, put 0 before the other 0 and carry 3, etc. In this way you would eventually arrive at the correct answer —if you did not get all mixed up in the meantime; but at best you would take a long time, because number sense would have played no part whatever in your awkward method of approaching this very simple little problem.

Suppose now that we introduce a little of this number sense—suppose that instead of dealing with plain figures, you were told to imagine that you had sold twelve machines on each of which you made a commission of $\$11.62\frac{1}{2}$. As soon

as money enters into the matter you immediately see the whole picture in a different light. If you were asked *approximately* how much your commissions amounted to, you would figure quick as a flash that 11 times 12 is 132, and you would probably answer instantly that you had made something over $132. If you were then asked *how much* over $132, you would either figure that $62\frac{1}{2}$¢ are $\frac{5}{8}$ of one dollar, or else that this amount is equal to half a dollar plus $\frac{1}{8}$ of a dollar. You would not take long in determining that the excess over $132 comes to $\$7\frac{1}{2}$ and that therefore the total amount received would be$\$139\frac{1}{2}$ or $139.50.

Why not apply to numbers "in the raw" the same methods that you use when dealing with small amounts of dollars and cents? It is no more difficult to multiply $11\frac{5}{8}$ thousands by 12 than $11\frac{5}{8}$ dollars. If $11\frac{5}{8}$ dollars times 12 is $139\frac{1}{2}$ dollars, then $11\frac{5}{8}$ thousands times 12 is $139\frac{1}{2}$ thousands, or 139,500.

From this illustration you may correctly infer that the person with number sense works very largely *from left to right* instead of from right to left. Left-to-right calculation is of the essence of number sense. Countless practical people know this, yet the art of left-to-right calculation is never taught in the schools, and is, in fact, rarely mentioned in books of any kind.

Step-by-step instruction and practice in this neglected art of left-to-right calculation constitutes the greater part of the substance of this book. Methods of this kind are applied not only to multiplication but to all the fundamental operations. By means of such methods, for instance, you learn to add two columns of figures at a time, and you even get a little practice in three-column addition. You are also taught comparable methods of subtraction and division.

In addition to the exercises having to do with left-to-right calculation, there are many that are based on an *extension of the multiplication table.* You are taught by easy stages to use all the numbers up to 25 as direct multipliers—that is to say, you acquire a *complete* knowledge of the multiplication table up to 25 times 25.

The subject of fractions is treated with special reference to the addition and subtraction of the fractions that are most commonly met with in everyday work. The object here is to enable the student to memorize the answers to the kinds of problems that are ordinarily figured out over and over again.

The exercises dealing with decimals are designed to give the student a large workable fund of knowledge of the decimal equivalents of fractions. Memory work includes twelfths and sixteenths, and there is practice in the rapid calculation of thirty-seconds and twenty-fourths.

The final broad subject developed in this book is "short cuts." These are of the highest value in developing a general understanding of numbers.

The subject matter of this book is limited to the four fundamental operations, with the inclusion of fractions and decimals. No attempt is made to consider the various fields of arithmetical application. Skill in calculation pure and simple is the only goal.

The exercises, nearly four hundred in number, are for the most part very short. Few should take more than ten minutes to do, and many will take less. As progress is by graded steps, the instruction is in small “doses.” The book, accordingly, can be used with profit whenever you happen to have a few free minutes. Its pocket size, moreover, makes it all the more suitable for odd-moment study.

Taken as a whole, this book will prove valuable to anybody engaged in work or study that requires any considerable amount of arithmetical calculation. It is especially recommended to heads of departments in industrial and commercial organizations, for general distribution to the members of their staffs.

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ANSWERS

THE PLAN OF THIS BOOK

The subject matter here presented might have been divided into sections on addition, subtraction, multiplication, etc., in the manner usual to text-books on arithmetic. Because, however, of the special purpose of this book, no such division is made. The general plan is to have several branches proceed simultaneously. Progress is not from subject to subject but from less to more difficult calculation.

For each of the fundamental divisions of arithmetic there is a general introduction—for instance, *Addition in General* on page 3. In these introductions the special objects sought are described, as well as the methods by which these objects are attained. The student, therefore, always has a clear view of the ultimate aims of his studies and knows how the work immediately in hand fits into the general plan.

Wherever anything new is introduced, it is clearly explained and illustrated. Usually the exercises that go with each explanation are spread through many succeeding pages. In a large number of cases the exercise calls for work with the numbers in a certain list or table (for instance, Table I on page 7). The same lists of numbers are used for various kinds of calculation. This method of presentation makes possible the remarkably great number (about 15,000) of practice examples that are included.

ADDITION IN GENERAL

Two main objects are sought. The first is to add by single columns, grouping three successive numbers at a time; the second is to add two columns at a time:

Take the following sum:

26
43
84
72
96
27
42
35
68
64
37
97

By the first method, starting at the top of the units' column, we would add these numbers thus: (sum of the first three figures) 13 (+ sum of the next three figures, 15) 28 (+ 15) 43 (+ 18) 61; write 1 and carry 6; (6 + 14) 20 (+ 18) 38 (+ 13) 51 (+ 18) 69; total, 691.

By the second method, starting at the top, we would add both columns simultaneously thus: (26 + 43) 69 (+ 84) 153 (+ 72) 225 (+ 96) 321 (+ 27) 348 (+ 42) 390 (+ 35) 425 (+ 68) 493 (+ 64) 557 (+ 37) 594 (+ 97) 691.

In actual practice, very rapid addition is possible by either method, and you will be left free to choose whichever you prefer. You should, however, learn both.

How do you proceed to learn these methods? You were taught—or should have been taught— at school that speed in addition is acquired by combining pairs of successive numbers that add up to 10. It is at this point that we start, because this is the simplest way in which grouped numbers can be added to a preceding sum. You are given short columns of numbers to be added by incidentally selecting such pairs of successive figures as make 10. In succeeding exercises the columns are lengthened, and you are also asked to group any pairs that add up to less than 10.

In the meantime, you will have been doing exercises in mentally adding all the numbers from 11 to 18 to all the numbers from 1 to 99. Since no pair of figures in a column can add to more than 18, this amount of practice will enable you to add *any* pair of successive figures in a column to a previous sum, and hence to add the entire column by taking two figures at a time.

You are similarly taught to add trios of numbers that make 10 or less than 10, and to add any number from 19 to 27 to any number from 1 to 99. With this practice you will be able to add *any* column by taking three figures at a time.

If you can quickly add any number from 1 to 27 to another number, you will not find it difficult to add numbers greater than 27 in the same manner. You are accordingly ready now to add two columns at a time. Exercises in this method are introduced, and these are gradually increased in difficulty.

Toward the end of the book there are some exercises in three-column addition —just enough to demonstrate that it will be possible for *you* to add this way if you wish to use this method.

There are examples in addition of still another kind. These are not included for practice in addition as such but have a special bearing on the art of multiplying mentally. We need not consider sums of this kind at this point.

You will note that in the exercises in one-column addition you are alternately instructed *to add from the top down* and *to add from the bottom up.* In practical work it is of course immaterial in which direction addition is performed. You should, however, be able to add with equal facility in either direction, and by alternating as suggested you will get the necessary practice.

Exercise No. 1

Pairs Adding to 10

Add the following columns by grouping pairs of numbers that make 10. *Add from the top down.*

Thus you would add the first column by saying to yourself : 7, 17, 22, 32.

Do not consciously repeat in your mind anything but the successive totals. That is to say, do *not* add this column thus: 7 + 10, 17, +5, 22, +10, 32.

For another illustration of the correct method, take the second example. This is added thus: 8, 18, 20, 30.

Write your answers in succession on a piece of paper and compare them with the correct answers on page 154. (A good plan is to place the edge of your paper

immediately under the examples, write the answers along this edge, and fold it under as it becomes used up.)

1.
7
6
4
5
1
9

2.
8
9
1
2
3
7

3.
4
5
5
5
4
6

4.
5
2
8
4
1
9

5.
6
4
6
3
2

8

6.

5
5
3
6
4
8

7.

5
4
6
6
3
7

8.

3
2
7
3
1
2

9.

8
2
9
8
1
9

10.

6
9
1
5
4
6

11.

5
5
3
2
4
6

12.

9
6
4
8
1
7

13.

3
7
6
2
8
8

14.

1
9
9
1
5
4

15.

6
4
4
5
4
3

16.

6
3
7
2
2
5

17.
1
3
7
9
3
7

18.
7
6
2
8
5
5

19.
1
9
4
3
9
1

20.
1
5
5
9
4
6

21.
6

4
7
6
3
7

22.
3
4
6
4
6
3

23.
7
5
5
3
6
2

24.
4
9
1
3
2
8

Table I
Numbers from 1 to 99

1	8	15	22	29	36	43	50
57	64	71	78	85	92	99	6
13	20	27	34	41	48	55	62
69	76	83	90	97	4	11	18
25	32	39	46	53	60	67	74
81	88	95	2	9	16	23	30
37	44	51	58	65	72	79	86
93	7	14	21	28	35	42	49
56	63	70	77	84	91	98	5
12	19	26	33	40	47	54	61
68	75	82	89	96	3	10	17
24	31	38	45	52	59	66	73
80	87	94					

Exercise No. 2

Mental Addition

Add 11 to each of the numbers in Table I above.

Use *left-to-right* addition, which is performed by first adding the tens of one number to the whole of another. In other words, starting with the number in the table you first add 10 and then 1. A few illustrations will be in order:

15 + 11: say 15, 25, 26;

22 + 11: say 22, 32, 33;

29 + 11: say 29, 39, 40;

99 + 11: say 99, 109, 110.

Work down the columns—not across the page. Write down your answers and compare them with those on page 154.

Exercise No. 3

Pairs Adding to 10

Group all pairs of successive numbers that make 10. *Add from the bottom up.*

1.
7
8
4
6
5
3
5
5

1
8
2
5

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

3.
5
2
5
4
6
6
7
3
4
8
2
4

4.
9
7
6
4
8
8

9
1
1
7
5
5

5.

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

6.

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

7.

4
7
3
8

3
2
2
8
1
9
1
9

8.
8
2
9
1
5
3
8
5
5
2
6
5

9.
4
4
3
2
4
6
1
6
4
9
3
7

10.
6
5

7
3
4
2
8
9
1
3
2
1

11.
9
8
8
2
7
1
9
6
5
d
9
4

12.
3
7
6
6
1
2
7
6
4
5
5
6

13.

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

14.

3
7
8
2
8
5
5
8
2
7
1
9

15.

9
1
6
3
7
5
4
6
4
3
2

9

16.

1
8
7
5
5
6
7
3
5
4
4
6

17.

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

18.

6
9
1
7
7
3
2
1
5

2
9
1

Exercise No. 4

Mental Addition

Add 12 to the numbers in Table I on page 7.
To illustrate:
15 + 12:say 15, 25, 27;
22 + 12: say 22, 32, 34;
29 + 12:say 29, 39, 41;
99 + 12:say 99, 109, 111.

Exercise No. 5

Mental Addition

Add 13 to the numbers in Table I on page **7**.

Exercise No. 6

Mental Addition

Add 14 to the numbers in Table I on page 7.

Exercise No. 7

Mental Addition

Add 15 to the numbers in Table I on page 7.

Exercise No. 8

Pairs Adding to 10 or Less

The grouping of pairs of successive numbers is now to be extended to include any that add to less than 10 as well as any that add to 10. That is to say, as you add each column watch to see whether any two successive numbers add to either 10 or less than 10, and if they do, make one addition of them to the preceding

sum.

For this exercise use the columns of numbers in Exercise No. 1 and compare your answers with those for Exercise No. 1. *Add from the top down.*

To illustrate, the first column is added: 7, 17, 23, 32; the second: 8, 18, 23, 30; the third: 9, 19, 29.

Exercise No. 9

Mental Addition

Add 16 to each of the numbers in Table I on page 7.

Exercise No. 10

Mental Addition

Add 17 to each of the numbers in Table I on page 7.

Exercise No. 11

Pairs Adding to 10 or Less

Add the columns in Exercise No. 3 by grouping all pairs of successive numbers that add to 10 or less than 10. *Add from the bottom up.*

Exercise No. 12

Mental Addition

Add 18 to each of the numbers in Table I on page 7.

Exercise No. 13

Adding Single Columns by Pairs

Add the following by single columns, taking pairs of successive numbers at a time. *Add from the top down.* The first example would be added: 5, 14, 25, write 5 and carry 2; 2, 12, 27, 36; answer 365.

1.

62
78
81
14
87

2.
29
75
36
69
43
16

3.
58
33
65
98
72
45

4.
87
62
94
27
89
74

5.
16
91
33
56
29
32

6.
19
99

36
71
61
41

7.
48
21
68
29
18
25

8.
77
29
49
11
51
53

9.
36
49
94
59
22
27

10.
63
78
96
44
41
88

11.
33
39
43

51
55
36

12.
21
79
74
85
63
82

13.
34
43
27
53
17
57

14.
24
14
11
15
75
78

15.
16
44
49
54
49
99

16.
31
35
67
44

84
42

17.
28
63
21
34
52
56

18.
63
35
12
31
81
15

19.
32
65
16
67
73
55

20.
63
28
76
45
69
62

21.
85
56
75
37
73

24

22.
54
42
68
13
99
84

23.
14
27
54
85
59
69

24.
68
42
28
34
83
16

25.
69
28
45
37
71
91

Exercise No. 14

Mental Addition

Add 19 to each of the numbers in Table I on page 7.

Exercise No. 15

Adding Single Columns by Pairs

Add the following by single columns, taking pairs of successive numbers at a time. *Add from the bottom up.* The first example would be added: 11, 15, 27, 42, 49, 60, write 0 and carry 6; 6, 17, 24, 37, 43, 54, 62; answer, 620.

1.

27
64
32
85
46
29
78
64
31
43
75
46

2.

81
28
75
43
96
57
51
89
75
42
54
86

3.

92
92
29
86

54
18
68
62
11
86
53
65

4.
16
14
14
31
97
65
29
79
73
22
58
64

5.
29
27
25
25
32
19
76
51
12
84
33
19

6.
43
51

38
36
37
33
41
87
62
23
95
44

7.
58
54
62
49
47
36
34
52
98
73
34
27

8.
74
69
65
74
71
58
47
35
63
31
84
45

9.

91
85
91
76
85
82
69
58
37
74
42
95

10.
99
13
96
13
87
96
93
87
69
47
75
53

11.
19
12
26
18
24
24
18
15
98
36
85

49

12.
39
41
23
37
29
35
98
29
26
91
48
96

13.
51
55
52
34
48
56
46
31
53
37
13
59

14.
63
62
62
63
45
59
67
57
42

64
48
24

15.
84
99
75
73
74
56
82
78
68
53
59
57

Exercise No. 16

Mental Addition

Add 20 to each of the numbers in Table I on page 7.

Exercise No. 17

Adding Single Columns by Pairs

Add the following by single columns, taking pairs of successive numbers at a time. *Add from the top down.*

1.
51
30
96
24
25
75
48
49

93
80
13
58
88
86
20
99
59
65

2.

42
53
90
79
87
76
92
52
45
72
18
63
22
21
59
91
15
78

3.

41
73
32
12
62
11
44

84
70
40
61
67
56
16
98
55
27
54

4.

34
36
97
19
69
94
83
37
38
46
17
23
66
64
89
68
60
23

5.

33
81
28
39
43
10

85
47
29
14
95
10
82
31
77
74
35
84

6.

61
81
82
24
59
95
53
37
27
31
92
83
80
38
54
98
41
77

7.

34
90
86
85
16

58
64
47
23
45
44
65
72
68
42
40
89
99

8.
39
32
21
49
87
33
48
11
60
20
70
26
55
57
12
46
75
18

9.
36
25
97
96

52
30
63
94
35
62
51
91
88
43
19
14
56
42

10.
17
66
28
74
84
15
67
93
73
69
10
29
79
78
22
13
76
39

Exercise No. 18

Mental Addition

Add 21 to each of the numbers in Table I on page 7.

SUBTRACTION IN GENERAL

In keeping with the general object of this book, the succeeding exercises in subtraction are performed by left-to-right methods.

When subtraction is performed on paper there is no special advantage in working from left to right instead of from right to left. Paper practice in the former method, however, fits in with the broad purpose of developing number sense.

When it comes to doing subtraction mentally, the left-to-right method is natural and logical. Thus, if you had started the day with $17.43 in your pocket, and if you wanted to figure without paper and pencil how much you had left after spending $5.89, you would not be likely to start by subtracting 9 from 13. You would probably calculate that if you had spent the full $6, you would have $11.43 left, but that having spent 11¢ less than $6, the remainder comes to 11¢ more than $11.43, or $11.54.

In considering the specific aims of these exercises in subtraction, look first at the written examples. If you will glance at the first exercise that follows, and which is included merely to familiarize you with the idea of working from left to right, you will see that in every case the figures in the subtrahend (lower number) are smaller than those in the minuend. The examples are all of the type of

$$\begin{array}{r} 54 \\ -23 \\ \hline \end{array}$$

and you can determine the answers faster than you can write them down. If, however, you take the example

$$\begin{array}{r} 685 \\ -356 \\ \hline \end{array}$$

and try to write the answer in the same way, you will run into trouble when you reach the final figures at the right because 6 is greater than 5. What to do about cases of this kind is the subject of the instruction. The exercises take into account the possible variations that may occur in numbers of two and three places.

The examples in mental subtraction are performed by methods altogether

different from those that apply to written work. There are two such methods, of which one has already been illustrated. We subtracted $5.89 from $17.43 by taking $6 from $17.43 and then adding to $11.43 the difference between $6 and $5.89, obtaining as our answer $11.43 + $.11, or $11.54. To do the same example mentally by the other method, we calculate that if you had started with $17 even, you would have $11.11 left; but you had $.43 more than $17 at the start, and therefore the actual remainder is $11.11 + $.43, or $11.54. One method is as good as the other. Examples are given that carry the practice in both methods as far as numbers involving hundreds of dollars and odd cents.

Incidentally, you should know that ordinary written subtraction is commonly performed by two entirely different methods—the *borrow* method and the *carry* method. The borrow method is taught almost exclusively in this country today, but in times past the carry method had similar acceptance.

Take the example

$$\begin{array}{r} 856 \\ -569 \\ \hline 287 \end{array}$$

To do this by the borrow method you reason: 9 from 16 leaves 7, 6 from 14 leaves 8, 5 from 7 leaves 2; answer, 287. To do the same example by the carry method you would say: 9 from 16 leaves 7, 7 from 15 leaves 8, 6 from 8 leaves 2; answer, 287.

You should understand both these methods (neither of which has any clear advantage over the other), though you continue to use regularly whichever one comes most naturally to you. In the illustrations given in this book the borrow method is followed because it is the more familiar to the majority of people.

Exercise No. 19

Left-to-Right Subtraction

Perform the following subtractions by directly writing your answers from left to right.

1.
67
55

2.
48

14

3.
41
20

4.
78
22

5.
64
31

6.
98
20

7.
53
41

8.
65
52

9.
28
16

10.
66
45

11.
99
92

12.
69
35

13.

83
31

14.
32
21

15.
93
41

Exercise No. 20

Left-to-Right Subtraction

Directly write your answers from left to right.

To take the first example, you simply note that 6 is greater than 4, and therefore the 5 in the minuend becomes a 4: 2 from 4 leaves 2 (writing 2), 6 from 14 leaves 8 (writing 8); answer 28.

1.
54
26

2.
47
19

3.
51
39

4.
46
27

5.
52
37

6.
84

58

7.
37
18

8.
35
17

9.
72
24

10.
50
29

11.
83
44

12.
56
39

13.
71
45

14.
96
38

15.
77
49

16.
94
76

17.

45
16

18.
48
29

19.
68
39

20.
71
52

Exercise No. 21

Mental Addition

Add 22 to each of the numbers in Table I on page 7.

Exercise No. 22

Trios that Add to 10 or Less

This exercise introduces the idea of taking in three successive numbers at a glance. Every column contains four groups of three numbers each; each of these groups adds to 10 or less. Add by combining these groups. *Add from the top down.*

1.
27
21
11
45
41
13
65
12
12
25

11
11

2.
14
11
12
33
21
13
25
21
24
35
12
13

3.
64
21
13
44
42
22
43
32
33
78
11
11

4.
57
31
12
56
21
23
56
12

12
45
21
12

5.
34
31
11
54
42
13
52
31
22
44
31
14

6.
41
21
26
31
31
22
81
11
11
72
21
13

7.
62
32
12
61
21
23

52
21
16
44
12
14

8.
43
33
24
21
11
27
43
11
45
62
12
15

9.
21
11
15
12
11
14
33
11
23
24
21
25

10.
33
12
15
63

11
24
42
22
44
43
32
33

Exercise No. 23

Left-to-Right Subtraction

Sight practice with pairs of three-place numbers. No borrowings are involved. Work from left to right.

1.
754
233

2.
827
614

3.
468
235

4.
659
338

5.
746
415

6.
928
615

7.
675

423

8.
558
146

9.
649
437

10.
458
328

11.
727
605

12.
898
457

13.
753
321

14.
462
111

15.
941
720

Exercise No. 24

Mental Addition

Add 23 to each of the numbers in Table I on page 7.

Exercise No. 25

Mental Addition

Add 24 to each of the numbers in Table I on page 7.

Exercise No. 26

Adding Single Columns by Pairs

Take successive pairs at a time. *Add from the top down.*

1. $40.72
33.32
98.21
29.05
53.69
79.66
83.97
45.77
42.63
46.68
64.39
37.62

2. $35.51
56.28
43.90
49.44
84.57
99.61
24.25
16.23
80.17
82.67
86.93
91.76

3.
$27.13
96.92
22.07
38.71

58.94
34.88
60.26
65.14
18.19
89.30
41.75
50.95

4.

$47.15
10.20
36.09
59.73
55.70
85.54
31.78
11.12
52.48
87.81
74.01
25.60

5.

$79.45
85.30
70.46
83.73
69.97
34.21
64.81
20.72
60.26
31.57
59.86
58.35

6.

$77.52
54.05

61.65
76.29
74.43
38.10
87.37
63.25
32.93
22.98
89.84
91.23

7.

$48.68
49.99
14.78
11.12
90.55
17.18
15.50
56.47
67.06
19.16
41.40
56.15

8.

$88.09
44.80
75.03
36.53
95.96
62.39
82.01
26.13
33.28
42.71
94.66
10.34

Exercise No. 27

Left-to-Right Subtraction

In these examples, in the vertical pairs of figures at the extreme right the subtrahend is greater than the minuend, reducing by 1 the tens' figure of the minuend.

Taking the first example, we note that the tens' figure of the minuend will become a 4 instead of a 5; 5 from 7 leaves 2, 3 from 4 leaves 1, 9 from 14 leaves 5; answer 215.

1.
754
539

2.
863
448

3.
528
319

4.
642
313

5.
995
217

6.
422
313

7.
323
109

8.
676
428

9.
266
138

10.
583
346

11.
912
509

12.
365
259

13.
744
619

14.
390
265

15.
555
419

16.
983
779

17.
696
587

18.
472
329

19.
713
606

20.
626
318

21.
718
409

22.
683
246

23.
951
229

24.
648
539

25.
873
358

26.
715
506

27.
582
246

28.
246
139

29.
997
129

30.
737
318

Exercise No. 28

Mental Addition

Add 25 to each of the numbers in Table I on page 7.

Exercise No. 29

Mental Addition

Add 26 to each of the numbers in Table I on page 7.

Exercise No. 30

Mental Addition

Add 27 to each of the numbers in Table I on page 7.

Exercise No. 31

Trios that Add to 20 or Less

In the separate columns of the following examples the successive groups of three figures add to some number between 11 and 20. Add by combining these groups of three. *Add from the top down.*

The first example would be added: 16, 30, 41, 61, write 1 and carry 6; 6, 18, 30, 46, 62; answer 621.

1.

23
46
67
21
55
58
22
54
95
12
69
99

2.

31
46
46
12
24
97
13
73
86
23
57
77

3.

12
84
89
33
43
78
13
37
99
13
88
98

4.

24
64
74
35
45
95
14
45
75
25

65
86

5.
24
74
78
35
55
78
14
44
99
25
35
69

6.
33
36
98
11
25
89
13
77
75
23
56
69

7.
32
44
58
13
33
77
23
57

88
31
46
68

8.
24
67
69
36
47
87
13
48
69
14
99
98

9.
34
54
56
25
25
89
24
64
97
35
55
67

10.
24
75
85
35
56
86

14
55
56
25
36
77

Exercise No. 32

Left-to-Right Subtraction

In the type of example given here we see by inspection that the subtrahend has a larger figure than the minuend in the tens' place, reducing by 1 the hundreds' figure of the minuend. To take the first example: 5 from 6 leaves 1, 9 from 15 leaves 6, 3 from 4 leaves 1; answer 161.

Subtract from left to right.

1.
754
593

2.
648
356

3.
262
191

4.
548
357

5.
629
458

6.
856
792

7.

435
183

8.
468
271

9.
914
291

10.
765
481

11.
787
693

12.
547
160

13.
341
171

14.
112
51

15.
783
190

16.
486
291

17.
888
494

18.
489
194

19.
944
452

20.
842
161

Exercise No. 33

Left-to-Right Subtraction

In these examples the tens and the units are larger in the subtrahend than in the minuend, thus reducing by 1 both the hundreds and the tens of the minuend. Taking the first example: 2 from 6 leaves 4, 8 from 14 leaves 6, 9 from 14 leaves 5; answer, 465.

1.
754
289

2.
773
194

3.
413
249

4.
484
298

5.
342
189

6.

626
578

7.
787
298

8.
383
197

9.
867
379

10.
672
295

11.
918
589

12.
666
197

13.
586
298

14.
232
176

15.
515
299

16.
353
169

17.
428
179

18.
856
779

19.
481
192

20.
318
149

Exercise No. 34

Adding Single Columns by Pairs

Add the following by single columns, taking pairs of successive numbers at a time. *Add from the bottom up.*

1.
$14.44
38.42
72.09
61.90
63.26
56.78
73.76
62.58
91.28
31.41
71.15
50.82
22.78
33.34
25.12
92.49
58.43

75.64

2.

$80.54
33.20
13.40
55.95
10.17
75.79
77.52
39.51
83.85
87.19
59.57
24.23
94.70
61.90
50.05
82.98
93.63
20.67

3.

$74.43
67.27
18.02
21.60
25.98
96.45
89.84
11.12
64.48
19.92
22.53
65.99
66.75
11.54
74.45
55.62

95.37
72.71

4.

$43.93
32.06
94.34
97.86
30.29
36.47
70.66
35.07
81.68
49.37
69.16
57.84
53.69
96.17
36.03
30.35
39.51
48.15

5.

$22.78
69.33
48.14
17.81
44.88
40.18
19.02
63.95
89.16
99.08
87.83
77.52
22.78
40.18
66.75

53.45
60.39
71.09

6.

$94.70
34.61
27.10
68.47
76.13
31.05
26.30
37.86
46.65
20.67
92.49
21.60
56.25
31.82
62.77
69.33
51.85
48.15

7.

$66.75
90.72
80.11
73.29
56.25
74.45
35.58
24.38
39.51
84.36
82.98
92.13
49.12
94.70

52.05
34.57
64.61
27.10

8.

$79.53
71.09
54.96
59.15
50.91
57.42
43.93
32.23
85.64
28.41
55.01
16.46
50.91
98.55
74.79
21.65
90.72
80.06

Exercise No. 35

Left-to-Right Subtraction

This exercise illustrates a principle: if a figure in the subtrahend is the same as the one above it in the minuend, the effect on the minuend will depend on whether or not a borrowing has been necessary with the next figure to the right.

In the first example we see that because 9 is greater than 4, the 5 in the minuend becomes a 4, and since 5 is greater than this the 7 in the minuend becomes a 6. We perform the subtraction thus: 3 from 6 leaves 3, 5 from 14 leaves 9, 9 from 14 leaves 5; answer, 395.

1.

754
359

2.
655
358

3.
251
159

4.
546
247

5.
592
294

6.
862
667

7.
444
146

8.
968
569

9.
773
279

10.
763
266

11.
832
536

12.
233
139

13.
983
488

14.
572
278

15.
656
357

16.
395
197

17.
856
659

18.
645
248

19.
721
428

20.
941
249

21.
527
329

22.
863
569

23.
985
389

24.
267
168

25.
843
448

Exercise No. 36

Trios that Add to 27 or Less

The groups of three here add to numbers between 21 and 27. Add by combining these groups. *Add from the top down.*

1.
36
98
99
69
99
99
56
89
89
73
79
99

2.
63
79
89
86
89
89
33
99
99
67

97
97

3.
47
87
98
74
78
79
67
77
97
84
88
99

4.
65
78
98
87
87
99
54
89
99
77
87
88

5.
47
97
99
75
78
89
49
89

99
75
78
78

6.
55
88
89
77
78
98
65
89
89
87
98
98

7.
68
88
88
85
99
99
57
98
99
76
87
98

8.
56
87
99
78
88
89

96
97
98
78
78
88

9.
68
88
99
96
98
98
68
89
99
96
97
99

10.
56
98
98
78
89
99
66
78
89
84
88
89

Exercise No. 37

Left-to-Right Subtraction

In these examples another consideration arises: the tens' figure in the minuend

is 0; when 1 is borrowed to make possible the subtraction of the units, the tens in the minuend become 9 and the hundreds are also reduced by 1.

To illustrate with the first example: 3 from 6 leaves 3, 5 from 9 leaves 4, 7 from 14 leaves 7; answer, 347.

Subtract from left to right.

1.
704
357

2.
307
118

3.
806
457

4.
204
126

5.
404
297

6.
808
549

7.
706
517

8.
308
189

9.
302
236

10.

203
115

11.
800
585

12.
501
323

13.
300
122

14.
805
796

15.
601
374

16.
902
793

17.
500
386

18.
408
159

19.
700
466

20.
207
178

21.
807
509

22.
603
319

23.
200
162

24.
600
224

25.
300
171

Exercise No. 38

Adding Single Columns by Pairs

Take pairs of successive numbers at a time. *Add from the bottom up.*

1.
$5759.37
2186.62
4491.67
3848.60
6874.79
1831.04
1080.33
6461.73
9823.34

2.
$7856.21
2477.50
5843.84

3993.36
4751.85
9213.53
3363.26
9994.90
9617.89

3.

$6525.49
5214.44
8788.76
1115.81
2740.32
4569.82
9528.30
7271.70
8983.55

4.

$4142.97
4629.22
2089.83
9766.48
3367.72
9849.04
1623.26
4308.52
5354.34
4244.07
6874.79
6118.91

5.

$6675.01
3508.07
5624.21
6039.10
7677.25
6393.03
6257.59

3646.51
9678.28
7170.27
3229.30
4569.73

6.

$1916.46
2009.03
6538.82
8788.80
7531.01
8635.19
5096.58
1185.13
1714.55
4015.81
6422.37
9947.94

Exercise No. 39

Mental Subtraction

Use the method of making the subtrahend a round number. Subtract $1 from the minuend and add to this the difference between $1 and the given subtrahend.

Taking the first example: $1 from $5.18 leaves $4.18; $.83 from $1 leaves $.17; $4.18 + $.17 = $4.35.

1. $5.18 - $.83
2. $6.42 - $.83
3. $1.89 - $.95
4. $2.47 - $.99
5. $7.48 - $.56
6. $8.29 - $.66
7. $3.18 - $.87
8. $7.27 - $.43
9. $4.19 - $.49
10. $3.53 - $.77

11. $3.22 - $.93
12. $7.37 - $.61
13. $4.56 - $.97
14. $6.87 - $.91
15. $2.21 - $.65
16. $4.86 - $.97
17. $3.32 - $.64
18. $7.75 - $.83
19. $4.12 - $.63
20. $6.23 - $.26

Exercise No. 40

Adding Single Columns by Trios

Do the addition examples in Exercise No. 13 on page 11 by grouping three numbers at a time.

Taking the first example there presented, the following illustrates the method of adding: 13 (+12) 25, write 5 and carry 2; 2 (+17) 19, (+17) 36; answer, 365. Do not consciously repeat to yourself the individual amounts that you are adding, but only the successive total. *Add from the top down.*

Exercise No. 41

Adding Single Columns by Pairs

1.

$7489.99
2897.66
7828.17
3519.16
2237.61
7170.27
5950.95
1209.63
8152.92
5354.14
7725.75
6101.98

5429.30
4414.57
7812.07
5056.24
2593.26
4569.35

2.

$8356.24
4860.39
8084.05
2303.32
1891.45
4015.94
5843.08
9326.73
3646.51
5520.33
3104.60
4953.91
6772.76
5910.18
7170.06
9564.22
2075.27
9236.74

3.

$2165.38
1034.96
8788.86
2922.64
4142.44
9062.57
9849.04
4768.79
1185.13
6772.76
1348.37

6039.62
1780.84
9134.96
8788.86
7755.63
4033.03
8932.58

4.

$8799.55
4437.14
9793.08
4223.59
3218.94
9564.65
6296.78
4569.35
7006.68
7976.92
3612.97
8765.77
5960.54
5546.31
4347.04
9570.06
6935.05
6774.27

5.

$1319.16
5781.63
5266.88
3926.73
9156.24
2227.49
1207.54
7729.30
6772.11
9036.17

8909.50
2930.51
9964.75
7188.86
4147.61
1457.10
3218.94
4913.26

6.

$8348.84
2538.82
2861.41
9809.50
5834.43
5340.33
5446.31
5115.71
8521.65
8074.89
2124.56
1507.23
2279.76
2858.34
8085.37
4884.44
8168.39
7273.93

Exercise No. 42

Mental Subtraction

Perform the subtractions in Exercise No. 39 by using the method of making a round number of the minuend. That is, reduce the minuend to the next lower number of even dollars. Subtract the subtrahend from this and then add the excess of cents in the minuend.

Taking the first example ($5.18 - $.83): $.83 from $5 leaves $4.17; $4.17 + 18 = $4.35.

Exercise No. 43

Mental Subtraction

Perform the following subtractions mentally. Raise the subtrahend to the next larger number of even dollars.

1. $2.79 - $1.86
2. $3.17 - $1.97
3. $9.50 - $6.69
4. $2.56 - $1.91
5. $4.77 - $2.81
6. $9.78 - $3.94
7. $7.44 - $4.49
8. $4.37 - $2.72
9. $5.22 - $2.98
10. $6.04 - $5.33
11. $5.53 - $3.64
12. $2.62 - $1.89
13. $3.05 - $1.82
14. $8.28 - $6.65
15. $8.10 - $6.39
16. $5.15 - $2.67
17. $4.47 - $2.61
18. $7.93 - $5.99
19. $5.40 - $2.95
20. $3.23 - $1.60

Exercise No. 44

Mental Subtraction

Do the examples in Exercise No. 43 by lowering the minuend to the next smaller number of even dollars.

MULTIPLICATION IN GENERAL

Multiplication is the heart's core of the art of calculation. In itself it constitutes an art about which a large volume might be written.

The multiplication exercises in this book have three main objects in view—first, to enable the student to use all numbers up to 25 as direct multipliers in written work; second, to teach him to multiply mentally any number up to 1000 by any other number up to 1000; third, to drill him in various short-cut methods that apply to particular cases.

The use of numbers up to 25 as direct multipliers may be illustrated by this example:

A	B
7648	7648
1923	1923
22944	175904
15296	145312
68832	14707104
7648	
14707104	

In Method A, which is here shown for comparison, the usual procedure is followed. In Method B the calculation is performed thus: 8 × 23 = 184, write 4 and carry 18; 4 × 23 = 92, 92 + 18 = 110, write 0 and carry 11; 6 × 23 = 138, 138 + 11 = 149, write 9 and carry 14; 7 × 23 = 161, 161 + 14 = 175. Multiplication by 19 is done in the same way, and the partial products added.

To multiply in the manner described it is of course necessary to acquire a knowledge of the multiplication table up to 25 × 25. Instruction in this direction is given by very easy steps. There are several types of exercises leading to the same end.

Exercises in mental multiplication are similarly graded. You start by multiplying two figures by one, then two by two, then three by one, three by two, and finally three by three.

The subject of short cuts is highly specialized and need not detain us for the present.

Exercise No. 45

Mental Multiplication

Multiply by 2 the numbers in Table I on page 7. Proceed from left to right. A few examples of the method calculating will suffice.

32 × 2 : 30 × 2 = 60, 2 × 2 = 4, 60 + 4 = 64
45 × 2 : 40 × 2 = 80, 5 × 2 = 10, 80 + 10 = 90
49 × 2 : 40 × 2 = 80, 9 × 2 = 18, 80 + 18 = 98
99 × 2 : 90 × 2 = 180, 9 × 2 = 18, 180 + 18 = 198

Exercise No. 46

Mental Multiplication

Multiply mentally by 3 the numbers in Table I on page 7.

Exercise No. 47

Mental Multiplication

Multiply mentally by 4 the numbers in Table I on page 7.

Exercise No. 48

Adding Single Columns by Pairs

Take pairs of successive numbers at a time. *Add from the bottom up.*

1.
$227976.55
491368.39
476170.02
804501.33
920950.63
512573.15

2.
$364631.71
291241.97
620314.57
378990.83
267278.30

586721.69

3.
$693505.74
822427.23
186620.98
871060.54
118577.94
996475.17

4.
$430413.93
525632.59
198886.28
651653.40
964295.81
480444.80

5.
$605465.38
599320.95
810064.74
112279.76
431275.17
890890.55

6.
$694235.68
483929.91
841653.40
344518.66
624133.37
364698.97

Exercise No. 49

Mental Subtraction

Raise the subtrahend to the next larger number of even dollars.

1. $19.03 - $.50
2. $26.52 - $.86

3. $24.27 - $.32
4. $15.58 - $.80
5. $42.35 - $.59
6. $39.29 - $.91
7. $16.53 - $.79
8. $43.12 - $.17
9. $61.70 - $.94
10. $72.04 - $.85
11. $67.30 - $.73
12. $60.54 - $.69
13. $94.20 - $.48
14. $81.64 - $.74
15. $76.34 - $.66
16. $62.41 - $.89

Exercise No. 50

Mental Multiplication

Multiply mentally by 5 the numbers in Table I on page 7.

Exercise No. 51

Mental Subtraction

Do the examples in Exercise No. 49 by reducing the minuend to the next smaller number of even dollars.

Exercise No. 52

Mental Multiplication

Multiply mentally by 6 the numbers in Table I on page 7.

Exercise No. 53

Mental Multiplication

Multiply mentally by 7 the numbers in Table I on page 7.

Exercise No. 54

Adding Single Columns by Pairs

Take pairs of successive numbers at a time. *Add from the top down.*

1.

$806054.65
681097.85
451866.93
431248.39
298291.24
322157.61
700177.25
714913.58
746789.23
569055.36
534011.98
281472.87

2.

$386942.35
933492.59
209507.09
751706.02
882750.78
305181.62
733115.33
379499.64
663265.52
444684.16
227976.86
77730.32

3.

$243130.39
158010.21
519794.95
893672.07
870485.02
834913.40

287919.76
697537.73
225942.35
435756.84
996168.05
164864.14

4.
$559663.93
882067.60
265254.65
332750.44
380353.71
462925.62
583492.78
411711.98
230882.09
911270.45
180190.66
744732.86

Exercise No. 55

Mental Subtraction

Raise the subtrahend to the next larger number of even dollars.

1. $24.31 - $4.55
2. $26.36 - $7.50
3. $49 13 - $4.62
4. $34.37 - $7.98
5. $43.12 - $1.70
6. $14.06 - $7.86
7. $15.10 - $2.88
8. $26.52 - $6.89
9. $96.15 - $8.88
10. $87.04 - $2.53
11. $79.19 - $7.58
12. $59.42 - $3.82
13. $99.05 - $1.90

14. $77.24 - $3.55
15. $67.60 - $5.97
16. $72.07 - $3.87

Exercise No. 56

Mental Multiplication

Multiply mentally by 8 the numbers in Table I on page 7.

Exercise No. 57

Adding Single Columns by Trios

Do the examples in Exercise No. 15 on page 12 by taking three successive numbers at a time. *Add from the top down.*

Exercise No. 58

Mental Subtraction

Do the examples in Exercise No. 55 by lowering the minuend to the next smaller number of even dollars.

Exercise No. 59

Addition of Partial Products

The type of exercise here presented has a bearing on mental multiplication. Thus the first example represents, in inverted position, the partial products we get when we multiply 15 by 53.

$$\begin{array}{r} 15 \\ 53 \\ \hline 45 \\ 750 \\ \hline 795 \end{array}$$

When partial products of this kind occur in mental multiplication you are of necessity compelled *to retain them in your mind.* Hence to develop your ability to do this kind of memory work, you are asked to read each example once and then write it three times on paper before you perform the mental addition.

Complete the mental addition before writing the answer. Work from left to

right. Thus in doing the first example you would say to yourself: 750, 790, 795. In doing the second you would say: 620, 680, 682.

1.
750
45

2.
620
62

3.
470
94

4.
740
74

5.
520
78

6.
880
44

7.
720
90

8.
880
66

9.
960
1

10.
840
72

11.
850
51

12.
540
81

13.
570
95

14.
220
88

15.
910
52

16.
680
4

17.
980
28

18.
280
84

19.
640
96

20.
690
92

21.
760
95

22.
810
54

23.
750
15

24.
910
78

25.
580
87

Exercise No. 60

Mental Multiplication

Multiply mentally by 9 the numbers in Table I on page 7.

Exercise No. 61

Mental Multiplication

Multiply mentally by 11 the numbers in Table I.

Exercise No. 62

Adding Single Columns by Pairs

Add from the bottom up.

1.
$698504.99
845643.09
761979.28
401349.83
740614.80
553930.31

896554.52
975160.67
417337.75
882110.35
116448.16
477406.66
801415.93
340939.01
380272.36
656958.68
882152.17
401304.99

2.

$457012.91
820823.58
622529.46
715303.47
159363.96
380272.36
268195.94
789234.17
773286.20
425922.98
669001.18
502733.07
906396.55
301831.05
820889.23
548620.61
874185.10
761944.26

3.

$662533.75
380277.80
847236.82
735356.57
236569.58

862061.88
178735.81
464385.34
425919.44
789249.94
395497.48
194426.67
129066.25
464347.56
316085.34
499498.27
776980.14
518437.35

4.

$473105.74
141593.51
111290.63
897350.27
379128.68
966221.52
644107.29
104004.99
266722.95
987983.35
183216.70
295788.92
336353.75
578389.73
740638.09
236540.02
159383.58
729128.36

Exercise No. 63

Mental Subtraction

Raise the subtrahend to the next larger number of even dollars.

1. $83.37 - $35.72
2. $68.20 - $61.99
3. $97.48 - $17.87
4. $64.41 - $29.67
5. $25.33 - $10.65
6. $79.58 - $51.84
7. $48.54 - $20.61
8. $52.17 - $30.32
9. $91.28 - $36.82
10. $76.42 - $62.59
11. $55.30 - $18.81
12. $95.12 - $90.66
13. $65.40 - $14.93
14. $37.35 - $28.82
15. $49.01 - $21.85
16. $81.03 - $41.16

Exercise No. 64

Continuous Addition Drill

Count by 3's to 75.
Count by 4's to 100.
Count by 6's to 150.
Count by 7's to 175.
Count by 8's to 200.
Count by 9's to 225.
Count by 11's to 275.
Count by 12's to 300.

Repeat this exercise three times.

Exercise No. 65

Mental Subtraction

Do the examples in Exercise No. 63 by lowering the minuend to the next smaller number of even dollars.

Exercise No. 66

Mental Addition

Read each of these examples once, write it three times and then add it mentally from left to right.

Be careful to think of the upper number in each case as something in the thousands and not as so many hundreds. Thus in the first example the upper number should be called one thousand seven hundred forty, *not* seventeen hundred forty. It is easier to think of comparatively small numbers as hundreds rather than as thousands plus hundreds, but this method of naming leads to trouble when dealing with larger numbers, and it is best to follow one uniform system.

1.
1740
87

2.
1650
55

3.
1080
90

4.
1280
96

5.
2430
81

6.
2560
64

7.
3690
82

8.
1120

80

9.
1450
87

10.
1140
95

11.
1320
88

12.
1350
78

13.
1340
67

14.
1320
88

15.
1920
96

16.
2340
78

17.
3680
92

18.
1080
84

19.

1950
65

20.
2520
72

Exercise No. 67

Mental Subtraction

Raise the subtrahend to the next larger number of even dollars.

1. $855.30 - $8.32
2. $844.16 - $7.29
3. $671.46 - $4.47
4. $834.06 - $4.09
5. $642.02 - $7.80
6. $836.11 - $8.68
7. $862.21 - $4.45
8. $532.13 - $4.41
9. $426.22 - $7.78
10. $912.25 - $5.33
11. $453.31 - $5.60
12. $594.10 - $7.23
13. $415.37 - $7.91
14. $520.39 - $9.76
15. $542.17 - $8.55
16. $673.29 - $9.44

Exercise No. 68

Adding Single Columns by Trios

Do the examples in Exercise No. 17 on page 15 by grouping three successive numbers at a time. *Add from the top down.*

Exercise No. 69

Mental Subtraction

Do the examples in Exercise No. 67 by reducing the minuend to the next smaller number of even dollars.

Table II

Numbers for Multiplication Table Drill

A	B	C	D	E	F	G	H	J	K	L	M
2	2	2	2	2	2	2	2	2	2	2	2
4	5	6	7	8	9	10	11	8	9	10	11
6	8	10	12	14	16	18	20	14	16	18	20
8	11	14	17	3	3	3	3	20	23	3	3
10	14	3	3	9	10	11	12	13	3	11	12
12	3	7	8	15	17	19	21	9	10	19	21
14	6	11	13	4	4	4	4	15	17	4	4
3	9	15	4	10	11	12	13	21	4	12	13
5	12	4	9	16	18	20	5	4	11	20	22
7	15	8	14	5	5	5	14	10	18	5	5
9	4	12	5	11	12	13	6	16	5	13	14
11	7	16	10	17	19	6	15	22	12	21	23
13	10	5	15	6	6	14	7	5	19	6	6
	13	9	6	12	13	7	16	11	6	14	15
		13	11	18	7	15	8	17	13	22	24
			16	7	14	8	17	6	20	7	7
				13	8	16	9	12	7	15	16
					15	9	18	18	14	23	25
						17	10	7	21	8	8
							19	13	8	16	17
								19	15	24	9
									22	9	18
										17	10
											19

Exercise No. 70

Multiplication Table Drill

Use Table II on this page. Multiply the numbers in Column A successively by 2, 3, 4, 5, 6, 7, 8, 9, 10,11, and 12. Repeat this exercise three times.

Exercise No. 71

Mental Subtraction

Raise the subtrahend to the next larger number of even dollars, and raise this amount in turn to an even $100. Thus, taking the first example: $100 from $365.42 leaves $265.42; $265.42 + $11 (difference between $100 and $89) equals $276.42; $276.42 + $.27 = $276.69.

1. $365.42 - $88.73
2. $950.49 - $94.98
3. $723.67 - $40.77
4. $614.15 - $93.79
5. $858.51 - $84.72
6. $928.36 - $36.82
7. $413.54 - $86.61
8. $342.21 - $96.62
9. $459.48 - $87.55
10. $553.18 - $81.64
11. $416.07 - $29.19
12. $426.22 - $95.78
13. $912.25 - $33.63
14. $753.46 - $56.57
15. $831.05 - $60.85
16. $743.16 - $68.29

Exercise No. 72

Adding Single Columns by Trios

Do the examples in Exercise No. 22 on page 20 by grouping three successive numbers at a time. *Add from the bottom up.*

Table III

Numbers to Be Multiplied

1. 111315
2. 111417
3. 121416
4. 121518
5. 541316
6. 171922
7. 182123
8. 897254
9. 248963
10. 258163
11. 222572
12. 541418
13. 192389
14. 151924

15. 212481

Exercise No. 73

Written Multiplication

Multiply the numbers in Table III by 6789.

Exercise No. 74

Mental Addition

Read each of the following examples once, write it three times and then add it mentally from left to right.

Think of the upper number in each case as being in the thousands and not the hundreds.

The first example would be added: 1280, 1480, 1536. In other words, take the first number as a whole, and then add to it successively the hundreds, tens and units of the second number.

1.
1280
256

2.
4410
196

3.
1960
686

4.
1380
115

5.
4620
693

6.
3060

170

7.
6510
837

8.
4150
664

9.
4080
204

10.
1110
185

11.
6480
144

12.
1450
174

13.
1640
246

14.
3350
268

15.
5150
44

16.
3510
51

17.

3040
04

18.
8080
528

19.
1240
72

20.
2250
405

Exercise No. 75

Mental Subtraction

Do the examples in Exercise No. 71 on page 49 by lowering the minuend. Reduce it to the next smaller number of even dollars. Taking the first example: $300 — $88.73 leaves $211.27; $211.27 + $65 = $276.27; $276.27 + $.42 = $276.69.

Exercise No. 76

Adding Single Columns by Trios

Do the examples in Exercise No. 26 on page 23 by grouping three successive numbers at a time. *Add from the top down.*

Exercise No. 77

Mental Multiplication

Multiply mentally by 12 the numbers in Table I on page 7.

Exercise No. 78

Adding Single Columns by Trios

Do the examples in Exercise No. 34 on page 28 by grouping three successive numbers at a time.

Exercise No. 79

Mental Subtraction

Raise the subtrahend to the next larger number of even hundreds of dollars.

1. $950.49 - $498.65
2. $646.43 - $456.57
3. $520.39 - $176.42
4. $821.13 - $468.54
5. $769.14 - $580.93
6. $831.05 - $685.34
7. $821.45 - $529.48
8. $862.39 - $197.76
9. $318.32 - $181.64
10. $636.09 - $549.95
11. $714.10 - $273.65
12. $821.45 - $599.97
13. $416.07 - $219.44
14. $640.02 - $493.79
15. $746.14 - $159.93
16. $752.30 - $183.81

Exercise No. 80

Mental Addition

Read each of the following examples once, write it three times and then add it mentally from left to right. The first example would be added: 16530, 17030, 17081.

1.
16530
551

2.
12930
431

3.
24920
623

4.
22080
552

5.
37150
743

6.
33650
673

7.
51780
863

8.
44460
741

9.
67340
962

10.
61810
883

11.
19360
242

12.
12160
152

13.
76960
962

14.
32670
363

15.
25380
282

16.
12690
141

17.
15320
766

18.
19620
654

19.
21720
543

20.
46650
933

21.
44160
736

Exercise No. 81

Written Multiplication

Multiply by 1112 each of the numbers in Table III on page 49. Wherever there occurs in the multiplicand a pair of figures that may be considered as 11 or 12, make one multiplication of this instead of two, and accordingly write down two figures in the partial product. Taking the first example:

```
  111315
    1112
 -------
 1335780
1224465
 -------
123782280
```

111315 is successively multiplied (from right to left) by 12 and 11 thus: 5 × 12 = 60, write 0 and carry 6; 1 × 12 = 12, 12 + 6 = 18, write 8 and carry 1; 3 × 12 = 36, 36 + 1 = 37, write 7 and carry 3; 11 × 12 = 132, 132+3 = 135, write 35 and carry 1; 1 × 12 = 12, 12 + 1 = 13, write 13. Multiplication by 11 is carried out in the same way.

In doing these examples be watchful about placing the second partial product *two* places to the left of the first.

Exercise No. 82

Adding Single Columns by Trios

Do the examples in Exercise No. 38 on page 32 by grouping three successive numbers at a time. *Add from the bottom up.*

Exercise No. 83

Mental Subtraction

Do the examples in Exercise No. 79 on page 51 by lowering the minuend to the next smaller number of even hundreds of dollars.

Exercise No. 84

Mental Addition

Read each of the following examples once, write it three times and then add it mentally from left to right.

Add in turn the thousands, hundreds, tens and units to the upper number. In doing the first example you should say to yourself something like the following: 18360 + 1224, 19360; 19360 + 224, 19560; 19560 + 24, 19584.

1.

18360
1224

2.
21630
2163

3.
24960
3328

4.
18820
5646

5.
16260
1084

6.
19530
1953

7.
21360
2848

8.
16420
4926

9.
18640
6524

10.
10290
2401

11.
13530
3608

12.
16860
5058

13.
29240
1462

14.
33680
2526

15.
28590
4765

16.
13230
3969

17.
26520
1326

18.
28840
2163

19.
24960
4160

20.
28290
5658

21.
14120
2118

Exercise No. 85

Continuous Addition Drill

Count by 4's to 100.
Count by 6's to 150.
Count by 7's to 175

Count by 8's to 200.
Count by 9's to 225.
Count by ll's to 275.
Count by 12's to 300.
Count by 13's to 325.

Repeat this exercise three times.

Exercise No. 86

Adding Single Columns by Trios

Do the examples in Exercise No. 41 on page 34 by grouping three successive numbers at a time. *Add from the top down.*

Exercise No. 87

Factoring

When numbers are multiplied together, they are considered *factors* of the resulting *product.* Thus 2 and 3 are factors of 6, and 3 and 5 are factors of 15.

Factoring a number is the process of resolving the number into the factors that will produce the number when multiplied together. Thus 36 may be factored as 2 × 18, or as 3 × 12, or as 4 × 9, or as 6 × 6.*

Any number that can be resolved into factors is called a *composite* number.

A *prime* number is one that has no factors besides itself and 1. Thus, 1, 2, 3, 5, 7, 11, 13, etc. are prime numbers.

* If it were required to give the *prime* factors of 36, these would be 2 × 2 × 3 × 3, but factoring into prime numbers has nothing to do with the purposes of this book.

On the pages starting with 146 will be found a table which analyzes all prime and composite numbers up to 625. You will be taught gradually to familiarize yourself with this entire table. The purpose of this is to help you to recognize quickly the character of these numbers—to enable you to multiply rapidly the factors that produce any of them, or to separate any of them into such factors.

Of special importance in this table are the numbers printed in italic type, since

these can be produced by two factors each of which is 25 or less.

It is quite commonly appreciated that very small numbers have a definite individuality which grows out of the many associations built up around them in our minds. The individual character of higher numbers becomes similarly apparent and unforgettable when we single them out for particular attention.

For the first exercise in factoring read the first two columns of the table on page 146, and then write these from memory (or calculation) in the same form.

In studying the table note that each composite number is factored by first taking the smaller factors in the order of their size, and that the combinations are not repeated. Thus the separate ways of factoring 48 are given as 2 × 24, 3 × 16, 4 × 12 and 6 × 8. These combinations are not repeated as 8 × 6, 12 × 4, 16 × 3, and 24 × 2.

Exercise No. 88

Multiplication Table Drill

Use Table II on page 48.

Multiply the numbers in Column A successively by 3, 4, 6, 7, 8, 9, 11, 12 and 13.

Repeat this exercise three times.

This exercise takes us the first step beyond the customary limits of the multiplication table, which ordinarily goes no farther than 12 × 12. Succeeding examples will enable you to memorize the products of all pairs of numbers up to 25 × 25.

No multiplication table, as such, is presented in this book, because learning the products of higher factors by sheer power of memory is extremely difficult. On the other hand, when you are put over and over again to the necessity of figuring out these higher combinations for yourself, they soon come to stick firmly in the mind.

Exercise No. 89

Mental Addition

Read each of the following examples once, write it three times, and then add it mentally from left to right. The first example would be added: 165300, 170300, 170810.

1.
165300
5510

2.
129300
4310

3.
249200
6230

4.
220800
5520

5.
371500
7430

6.
336500
6730

7.
517800
8630

8.
444600
7410

9.
673400
9620

10.
618100
8830

11.
193600
2420

12.
121600
1520

13.
769600
9620

14.
326700
3630

15.
253800
2820

16.
126900
1410

17.
153200
7660

18.
196200
6540

19.
217200
5430

20.
456500
9330

21.
441600
7360

Exercise No. 90

Mental Multiplication

Multiply mentally by 13 the numbers in Table I on page 7.

In working with numbers from 80 upward, immediately name 1000 as the first part of the product. Thus 83 × 13 is 1040, (+39) 1079; 97 × 13 is 1170, 1261.

Exercise No. 91

Adding Single Columns by Trios

Do the examples in Exercise No. 48 on page 39 by grouping three successive numbers at a time. *Add from the bottom up.*

Exercise No. 92

Factoring

Read the table on page 146 from 31 to 72 inclusive, and then write it in the same form.

Exercise No. 93

Mental Addition

Read each of the following examples once, write it three times and then add it mentally from left to right.

Add in turn the tens of thousands, thousands, hundreds and tens to the upper number. The first example would be added: 183600, 193600, 195600, 195840.

1.
183600
12240

2.
216300
21630

3.
249600
33280

4.
188200
56460

5.
162600
10840

6.
195300
19530

7.
213600
28480

8.
164200
49260

9.
186400
65240

10.
102900
24010

11.
135300
36080

12.
168600
50580

13.
292400
14620

14.
336800
25260

15.
285900
47650

16.
132300
39690

17.
265200
13260

18.
288400
21630

19.
249600
41600

20.
282900
56580

21.
141200
21180

Exercise No. 94

Written Multiplication

Multiply by 1213 each of the numbers in Table III on page 49. Wherever there occurs in the multiplicand a pair of figures that may be considered as 11, 12 or 13, make one multiplication of this instead of two, and write two figures in the partial product. Thus, taking the first example, we successively multiply 15, 13 and 11 by 13 and again by 12. The partial products are accordingly written in two lines instead of the customary four.

Exercise No. 95

Adding Single Columns by Trios

Do the examples in Exercise No. 54 on page 41 by grouping three successive numbers at a time. *Add from the top down.*

Exercise No. 96

Factoring

Factor the numbers from 54 to 92 inclusive in the form shown in the table on page 146.

Exercise No. 97

Mental Addition

Read each of the following examples once, write it three times and then add it mentally from left to right.

Add the whole of the second number to the first before considering the third. Repeat to yourself several times the sum of the first and second if you find this necessary.

The third example would be added: 36300, 39300, 39930; (repeat 39930, 39930); 39930, 40030, 40051.

1.
10100
1010
101

2.
22200
2220
222

3.
36300
3630
121

4.
52400

5240
262

5.
70500
7050
141

6.
90600
1510
302

7.
19100
9950
382

8.
20200
1010
101

9.
33300
2220
222

10.
48400
3630
121

11.
65500
5240
262

12.
84600
7050
141

13.
18100
7240
181

14.
38200
9050
905

15.
20200
4040
202

16.
42400
6360
424

17.
66600
8880
666

18.
40400
4040
404

19.
33600
3360
336

20.
88800
8880
222

21.
30300

Exercise No. 98

Continuous Addition Drill

Count by 6's to 150.
Count by 7's to 175.
Count by 8's to 200.
Count by 9's to 225.
Count by 11's to 275.
Count by 12's to 300.
Count by 13's to 325.
Count by 14's to 350.

Repeat this exercise three times.

Exercise No. 99

Adding Single Columns by Trios

Do the examples in Exercise No. 62 on page 44 by grouping three successive numbers at a time. *Add from the bottom up.*

Exercise No. 100

Factoring

Factor the numbers from 73 to 111 inclusive in the form shown in the table on page 146.

Exercise No. 101

Mental Addition

Read each of the following examples once, write it three times and then add it mentally from left to right.

The first example would be added: 26200, 33200, 34000, 34060; 34060, 36060, 36156.

1.
26200
7860
2096

2.
48400
9680
1210

3.
69900
9320
1398

4.
12100
9680
1089

5.
26400
9240
1056

6.
42900
8580
1144

7.
61600
9240
1078

8.
82500
9900
1155

9.
88000

8800
1056

10.
93500
9350
1122

11.
98000
9800
1188

12.
73200
9760
1098

13.
93100
9310
1064

14.
97600
9760
1220

15.
71000
7100
1065

16.
46600
9320
1398

17.
57700
5770
2308

18.
68800
6880
2064

19.
79900
7990
3196

20.
24600
9840
1107

21.
70200
9320
1170

Exercise No. 102

Multiplication Table Drill

Use Table II on page 48.

Multiply the numbers in Column A successively by 4, 6, 7, 8, 9, 11, 12, 13 and 14.

Repeat this exercise three times.

Exercise No. 103

Two-Column Addition

You are now ready to start adding two columns at a time. Take Exercise No. 13 on page 11. *Add from the top down.*

Two-column addition is simply an application of the left-to-right methods which you have already learned. To illustrate with the first example:

43
62
78
81

14
87

This would be added: 43, 103, 105, 175, 183, 263, 264, 274, 278, 358, 365. These are the actual steps, but with practice you will read this as 105, 183, 264, 278, 365.

Exercise No. 104

Factoring

Factor the numbers from 93 to 129 inclusive in the form shown in the table on pages 146 and 147.

Exercise No. 105

Mental Addition

Read each of the following examples once, write it three times, and then add it mentally from left to right.

1.
112700
3220
161

2.
136800
5130
342

3.
162900
2400
181

4.
105700
1510
302

5.

128800
3220
161

6.
153900
5130
342

7.
151200
5040
756

8.
183400
7860
262

9.
176400
5040
252

10.
209600
7860
524

11.
104800
5240
524

12.
103200
6880
860

13.
114100
6520

978

14.

112800
7050
423

15.

126000
7560
756

16.

111000
9250
740

17.

104400
8700
870

18.

135900
9060
302

19.

112800
9870
141

20.

130500
8700
435

21.

136800
6800
684

Exercise No. 106

Mental Multiplication

Multiply mentally by 14 the numbers in Table I on page 7.

Exercise No. 107

Two-Column Addition

Do the examples in Exercise No. 17 on page 15 by adding two columns at a time.*Add from the bottom up.*

Exercise No. 108

Factoring

Factor the numbers from 112 to 145 inclusive in the form shown in the table on pages 146 and 147.

Exercise No. 109

Mental Addition

Read each of the following examples once, write it three times, and then add it mentally from left to right.

1.
121000
14520
484

2.
217600
10880
544

3.
253800
14100
846

4.

116000
11600
464

5.
145200
14520
726

6.
224800
10880
816

7.
171500
24010
343

8.
211800
10590
706

9.
344700
22980
383

10.
129200
16150
323

11.
166500
19980
666

12.
290400
14520

363

13.
335700
18650
746

14.
272400
18160
454

15.
324800
23200
928

16.
124200
20700
828

17.
317800
18160
454

18.
371200
23200
924

19.
395500
34200
565

20.
210000
36750
525

21.
540800
33800
676

Exercise No. 110

Written Multiplication

Multiply by 1314 the numbers in Table III on page 49.

Exercise No. 111

Two-Column Addition

Do the examples in Exercise No. 26 on page 23 by adding two columns at a time. *Add from the top down.*

Exercise No. 112

Factoring

Factor the numbers from 130 to 162 inclusive in the form shown in the table on page 147.

Exercise No. 113

Mental Addition

Read each of the following examples once, write it three times, and then add it mentally from left to right.

1.
123200
39800
1232

2.
187800
37560
1878

3.
254400
44520
2544

4.
323000
51680
3230

5.
393600
59040
3936

6.
466200
26640
4662

7.
616200
41160
1392

8.
121200
48480
2424

9.
184800
55440
3080

10.
250400
25040
3956

11.
318000

31800
4452

12.
387600
38760
1292

13.
439200
43920
1312

14.
532800
53280
1998

15.
608400
60840
2704

16.
139200
34800
1392

17.
143400
28680
1434

18.
218700
36350
2187

19.
294800
44220
2948

20.

373500
52290
3735

21.

454200
60560
4542

Exercise No. 114

Continuous Addition Drill

Count by 7's to 175.
Count by 8's to 200.
Count by 9's to 225.
Count by 11's to 275.
Count by 12's to 300.
Count by 13's to 325.
Count by 14's to 350.
Count by 15's to 375.

Repeat this exercise three times.

Exercise No. 115

Two-Column Addition

Do the examples in Exercise No. 34 on page 28 by adding two columns at a time. *Add from the bottom up.*

Exercise No. 116

Multiplication Table Drill

Use Table II on page 48.

Multiply the numbers in Column B successively by 6, 7, 8, 9, 11, 12, 13, 14 and 15.

Repeat this exercise three times.

Exercise No. 117

Factoring

Factor the numbers from 146 to 179 inclusive in the form shown in the table on page 147.

Exercise No. 118

Two-Column Addition

Do the examples in Exercise No. 38 on page 32 by adding two columns at a time. *Add from the top down.*

It slows up addition by two columns to keep repeating the number of hundreds as you go along. A good plan is to keep tally of the number of hundreds with a pencil. In all addition of long columns write numbers to be carried either at the head of the next column or beneath the figures in the total as you set them down. When looking for errors in addition, add in the opposite direction from that in which the addition was originally performed.

Exercise No. 119

Mental Multiplication

Multiply mentally by 15 the numbers in Table I on page 7.

Exercise No. 120

Two-Column Addition

Do the examples in Exercise No. 41 on page 34 by adding two columns at a time. *Add from the bottom up.*

Exercise No. 121

Factoring

Factor the numbers from 163 to 194 inclusive in the form shown in the table on page 147.

Exercise No. 122

Two-Column Addition

Do the examples in Exercise No. 48 on page 39 by adding two columns at a time. *Add from the top down.*

Exercise No. 123

Written Multiplication

Multiply by 1415 the numbers in Table III on page 49.

Exercise No. 124

Two-Column Addition

Do the examples in Exercise No. 54 on page 41 by adding two columns at a time. *Add from the bottom up.*

Exercise No. 125

Factoring

Factor the numbers from 180 to 209 inclusive in the form shown in the table on page 147.

Exercise No. 126

Two-Column Addition

Do the examples in Exercise No. 62 on page 44 by adding two columns at a time. *Add from the top down.*

Exercise No. 127

Continuous Addition Drill

Count by 8’s to 200.
Count by 9’s to 225.
Count by 11’s to 275.
Count by 12’s to 300.
Count by 13’s to 325.
Count by 14’s to 350

Count by 14's to 350.
Count by 15's to 375.
Count by 16's to 400.

Repeat this exercise three times.

Exercise No. 128

Three-Column Addition

With the practice you have had in two-column addition you should now be able to add three columns at a time. Try this with the examples in Exercise No. 38 on page 32. No additional exercises in three-column addition are given, but you can of course practice it on your own account if you so desire.

Exercise No. 129

Multiplication Table Drill

Use Table II on page 48.

Multiply the numbers in Column C successively by 7, 8, 9, 11, 12, 13, 14, 15 and 16.

Repeat this exercise three times.

Exercise No. 130

Factoring

Factor the numbers from 195 to 224 inclusive in the form shown in the table on pages 147 and 148.

Exercise No. 131

Mental Multiplication

Multiply mentally by 16 the numbers in Table I on page 7.

Exercise No. 132

Written Multiplication

Multiply by 1516 the numbers in Table III on page 49.

Exercise No. 133

Factoring

Factor the numbers from 210 to 239 inclusive in the form shown in the table on pages 147 and 148.

DIVISION IN GENERAL

Division is multiplication in reverse. As you improve in multiplication you automatically develop your skill at division. For this reason it has been considered unnecessary to include any exercises in long division.

Exercises, however, are given in mental division, in order to round out your general calculating ability. These exercises are of the following types:

First you use the numbers from 2 to 25 as direct divisors, securing quotients from 1 to 99. Then you divide by the numbers from 2 to 9, finding answers of three places. Again, you divide by three-place numbers to arrive at quotients of one figure plus a remainder; the remainder is included so that the answer cannot be guessed but must be calculated accurately. Finally, you divide by numbers of two places and get results of two places. As division is somewhat more complicated, the exercises in division are not carried so far as those in multiplication.

Exercise No. 134

Mental Division

Divide mentally by 2 the answers to Exercise No. 45 as given on pages 161 and 162. Compare your answers with Table I on page 7.

Exercise No. 135

Continuous Addition Drill

Count by 9’s to 225.
Count by 11’s to 275.
Count by 12’s to 300.
Count by 13’s to 325.
Count by 14’s to 350.
Count by 15’s to 375.
Count by 16’s to 400.
Count by 17’s to 425.

Repeat this exercise three times.

Exercise No. 136

Mental Division

Divide mentally by 3 the answers to Exercise No. 46 as given on page 162. Compare your answers with Table I on page 7.

Exercise No. 137

Multiplication Table Drill

Use Table II on page 48.

Multiply mentally the numbers in Column D by 8, 9, 11, 12, 13, 14, 15, 16 and 17.

Repeat this exercise three times.

Exercise No. 138

Factoring

Factor the numbers from 225 to 254 inclusive in the form shown in the table on page 148.

Exercise No. 139

Mental Division

Divide mentally by 4 the answers to Exercise No. 47 as given on page 162. Compare your answers with Table I on page 7.

Exercise No. 140

Mental Multiplication

Multiply mentally by 17 the numbers in Table I on page 7.

Exercise No. 141

Written Multiplication

Multiply by 1617 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 17.

Exercise No. 142

Factoring

Factor the numbers from 240 to 269 inclusive in the form shown in the Table on page 148.

Exercise No. 143

Mental Division

Divide mentally by 5 the answers to Exercise No. 50 as given on page 163. Compare your answers with Table I on page 7.

Exercise No. 144

Continuous Addition Drill

Count by 11's to 275.
Count by 12's to 300.
Count by 13's to 325.
Count by 14's to 350.
Count by 15's to 375.
Count by 16's to 400.
Count by 17's to 425.
Count by 18's to 450.

Repeat this exercise three times.

Exercise No. 145

Multiplication Table Drill

Use Table II on page 48.

Multiply mentally the numbers in Column E by 9, 11, 12, 13, 14, 15, 16, 17 and 18.

Repeat this exercise three times.

Exercise No. 146

Factoring

Factor the numbers from 255 to 284 inclusive in the form shown in the table on page 148.

Exercise No. 147

Mental Division

Divide mentally by 6 the answers to Exercise No. 52 as given on page 163. Compare your answers with Table I on page 7.

Exercise No. 148

Mental Multiplication

Multiply mentally by 18 the numbers in Table I on page 7.

Exercise No. 149

Written Multiplication

Multiply by 1718 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 18.

Exercise No. 150

Factoring

Factor the numbers from 270 to 299 inclusive in the form shown in the table on pages 148.

Exercise No. 151

Mental Division

Divide mentally by 7 the answers to Exercise No. 53 as given on pages 163 and 164. Compare your answers with Table I on page 7.

Exercise No. 152

Continuous Addition Drill

Count by 12's to 300

Count by 12's to 300.
Count by 13's to 325.
Count by 14's to 350.
Count by 15's to 375.
Count by 16's to 400.
Count by 17's to 425.
Count by 18's to 450.
Count by 19's to 475.

Repeat this exercise three times.

Exercise No. 153

Multiplication Table Drill

Use Table II on page 48.

Multiply mentally the numbers in Column F by 11, 12, 13, 14, 15, 16, 17, 18 and 19.

Repeat this exercise three times.

Exercise No. 154

Factoring

Factor the numbers from 285 to 312 inclusive in the form shown in the table on page 148.

Exercise No. 155

Mental Division

Divide mentally by 8 the answers to Exercise No. 56 as given on page 164. Compare your answers with Table I on page 7.

Exercise No. 156

Mental Multiplication

Multiply mentally by 19 the numbers in Table I on page 7.

Exercise No. 157

Factoring

Factor the numbers from 300 to 328 inclusive in the form shown in the table on page 148.

Exercise No. 158

Mental Division

Divide mentally by 9 the answers to Exercise No. 60 as given on page 164. Compare your answers with Table I on page 7.

Exercise No. 159

Written Multiplication

Multiply by 1819 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 19.

Exercise No. 160

Factoring

Factor the numbers from 313 to 343 inclusive in the form shown in the table on page 149.

Exercise No. 161

Mental Division

Divide mentally by 11 the answers to Exercise No. 61 as given on page 165. Compare your answers with Table I on page 7.

Exercise No. 162

Multiplication Table Drill

Use Table II on page 48.

Multiply mentally the numbers in Column G by 12, 13, 14, 15, 16, 17, 18, 19 and 20.

Exercise No. 163

Factoring

Factor the numbers from 329 to 359 inclusive in the form shown in the table on pages 148 and 149.

Exercise No. 164

Mental Division

Divide mentally by 12 the answers to Exercise No. 77 as given on page 166. Compare your answers with Table I on page 7.

Exercise No. 165

Mental Multiplication

Multiply mentally by 20 the numbers in Table I on page 7.

Exercise No. 166

Written Multiplication

Multiply by 1920 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 20.

Exercise No. 167

Factoring

Factor the numbers from 344 to 372 inclusive in the form shown in the table on page 149.

Exercise No. 168

Mental Division

Divide mentally by 13 the answers to Exercise No. 90 as given on page 167. Compare your answers with Table I on page 7.

Exercise No. 169

Continuous Addition Drill

Count by 13's to 325.
Count by 14's to 350.
Count by 15's to 375.
Count by 16's to 400.
Count by 17's to 425.
Count by 18's to 450.
Count by 19's to 475.
Count by 21's to 525.

Exercise No. 170

Multiplication Table Drill

Use Table II on page 48.

Multiply mentally the numbers in Column H by 12, 13, 14, 15, 16, 17, 18, 19, 20 and 21.

Exercise No. 171

Factoring

Factor the numbers from 360 to 386 inclusive in the form shown in the table on page 149.

Exercise No. 172

Mental Multiplication

Multiply mentally by 21 the numbers in Table I on page 7.

Exercise No. 173

Written Multiplication

Multiply by 2021 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 21.

ExerciseNo. 174

Factoring

Factor the numbers from 373 to 399 inclusive in the form shown in the table on pages 149 and 150.

Exercise No. 175

Mental Division

Divide mentally by 14 the answers to Exercise No. 106 as given on page 168. Compare your answers with Table I on page 7.

Exercise No. 176

Continuous Addition Drill

Count by 14's to 350.
Count by 15's to 375.
Count by 16's to 400.
Count by 17's to 425.
Count by 18's to 450.
Count by 19's to 475.
Count by 21's to 525.
Count by 22's to 550.

Repeat this exercise three times.

Exercise No. 177

Multiplication Table Drill

Use Table II on page 48.

Multiply mentally the numbers in Column J by 13, 14, 15, 16, 17, 18, 19, 20, 21 and 22.

Exercise No. 178

Factoring

Factor the numbers from 387 to 413 inclusive in the form shown in the table

on pages 149 and 150.

Exercise No. 179

Mental Multiplication

Multiply mentally by 22 the numbers in Table I on page 7.

Exercise No. 180

Written Multiplication

Multiply by 2122 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 22.

Exercise No. 181

Factoring

Factor the numbers from 400 to 427 inclusive in the form shown in the table on page 150 -

Exercise No. 182

Mental Division

Divide mentally by 15 the answers to Exercise No. 119 as given on page 169. Compare your answers with Table I on page 7.

Exercise No. 183

Continuous Addition Drill

Count by 15’s to 375.
Count by 16’s to 400.
Count by 17’s to 425.
Count by 18’s to 450.
Count by 19’s to 475.
Count by 21’s to 525.
Count by 22’s to 550.
Count by 23’s to 575.

Repeat this exercise three times.

Exercise No. 184

Multiplication Table Drill

Use Table II on page 48.

Multiply mentally the numbers in Column K by 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23.

Exercise No. 185

Factoring

Factor the numbers from 414 to 440 inclusive in the form shown in the table on page 150.

Exercise No. 186

Mental Multiplication

Multiply mentally by 23 the numbers in Table I on page 7.

Exercise No. 187

Written Multiplication

Multiply by 2223 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 23.

Exercise No. 188

Factoring

Factor the numbers from 428 to 455 inclusive in the form shown in the table on page 150.

Exercise No. 189

Mental Division

Divide mentally by 16 the answers to Exercise No. 131 as given on pages 169 and 170. Compare your answers with Table I on page 7.

Exercise No. 190

Continuous Addition Drill

Count by 16's to 400.
Count by 17's to 425.
Count by 18's to 450.
Count by 19's to 475.
Count by 21's to 525.
Count by 22's to 550.
Count by 23's to 575.
Count by 24's to 600.

Repeat this exercise three times.

Exercise No. 191

Multiplication Table Drill

Use Table II on page 48.

Multiply mentally the numbers in Column L by 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24.

Exercise No. 192

Factoring

Factor the numbers from 441 to 467 inclusive in the form shown in the table on pages 150 and 151.

Exercise No. 193

Mental Multiplication

Multiply mentally by 24 the numbers in Table I on page 7.

Exercise No. 194

Written Multiplication

Multiply by 2324 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 24.

Exercise No. 195

Factoring

Factor the numbers from 456 to 479 inclusive in the form shown in the table on pages 150 and 151.

Exercise No. 196

Mental Division

Divide mentally by 17 the answers to Exercise No. 140 as given on page 170. Compare your answers with Table I on page 7.

Exercise No. 197

Continuous Addition Drill

Count by 17's to 425.
Count by 18's to 450.
Count by 19's to 475.
Count by 21's to 525.
Count by 22's to 550.
Count by 23's to 575.
Count by 24's to 600.
Count by 25's to 625.

Repeat this exercise three times.

Exercise No. 198

Multiplication Table Drill

Use Table II on page 48.

Multiply mentally the numbers in Column M by 16, 17, 18, 19, 20, 21, 22, 23, 24 and 25.

Exercise No. 199

Factoring

Factor the numbers from 468 to 491 inclusive in the form shown in the table on page 151.

Exercise No. 200

Mental Multiplication

Multiply mentally by 25 the numbers in Table I on page 7.

Exercise No. 201

Written Multiplication

Multiply by 2425 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 25.

Exercise No. 202

Factoring

Factor the numbers from 480 to 503 inclusive in the form shown in the table on page 151.

Exercise No. 203

Mental Division

Divide mentally by 18 the answers to Exercise No. 148 as given on page 170 and 171. Compare your answers with Table I on page 7.

Exercise No. 204

Mental Multiplication

Multiply mentally by 20 the numbers in Table I on page 7.

Exercise No. 205

Continuous Addition Drill

Count by 18's to 450.
Count by 19's to 475.
Count by 21's to 525.
Count by 22's to 550.
Count by 23's to 575.
Count by 24's to 600.
Count by 25's to 625.

Repeat this exercise three times.

Exercise No. 206

Factoring

Factor the numbers from 492 to 515 inclusive in the form shown in the table on page 151.

Exercise No. 207

Continuous Addition Drill

Count by 19's to 475.
Count by 21's to 525.
Count by 22's to 550.
Count by 23's to 575.
Count by 24's to 600.
Count by 25's to 625.

Repeat this exercise three times.

Exercise No. 208

Mental Multiplication

Multiply mentally by 30 the numbers in Table I on page 7.

Exercise No. 209

Factoring

Factor the numbers from 504 to 527 inclusive in the form shown in the table on page 151.

Exercise No. 210

Mental Division

Divide mentally by 19 the answers to Exercise No. 149 as given on page 171. Compare your answers with Table I on page 7.

Exercise No. 211

Continuous Addition Drill

Count by 21's to 525.
Count by 22's to 550.
Count by 23's to 575.
Count by 24's to 600.
Count by 25's to 625.

Repeat this exercise three times.

Exercise No. 212

Mental Multiplication

Multiply mentally by 40 the numbers in Table I on page 7.

Exercise No. 213

Factoring

Factor the numbers from 516 to 539 inclusive in the form shown in the table on page 151.

Exercise No. 214

Continuous Addition Drill

Count by 22's to 550.
Count by 23's to 575.
Count by 24's to 600.
Count by 25's to 625.

Repeat this exercise three times.

Exercise No. 215

Mental Multiplication

Multiply mentally by 50 the numbers in Table I on page 7.

Exercise No. 216

Factoring

Factor the numbers from 528 to 551 inclusive in the form shown in the table on pages 151 and 152.

Exercise No. 217

Continuous Addition Drill

Count by 23's to 575.
Count by 24's to 600.
Count by 25's to 625.

Repeat this exercise three times.

Exercise No. 218

Mental Division

Divide mentally by 20 the answers to Exercise No. 165 as given on page 172. Compare your answers with Table I on page 7.

Exercise No. 219

Mental Multiplication

Multiply mentally by 60 the numbers in Table I on page 7.

Exercise No. 220

Factoring

Factor the numbers from 540 to 564 inclusive in the form shown in the table on page 152.

Exercise No. 221

Continuous Addition Drill

Count by 24's to 600.
Count by 25's to 625.

Repeat this exercise three times.

Exercise No. 222

Mental Multiplication

Multiply mentally by 70 the numbers in Table I on page 7.

Exercise No. 223

Factoring

Factor the numbers from 552 to 576 inclusive in the form shown in the table on page 152.

Exercise No. 224

Mental Division

Divide mentally by 21 the answers to Exercise No. 172 as given on page 172. Compare your answers with Table I on page 7.

Exercise No. 225

Continuous Addition Drill

Count by 25's to 625.

Repeat this exercise three times.

Exercise No. 226

Mental Multiplication

Multiply mentally by 80 the numbers in Table I on page 7.

Exercise No. 227

Factoring

Factor the numbers from 565 to 592 inclusive in the form shown in the table on page 152.

Exercise No. 228

Mental Multiplication

Multiply mentally by 90 the numbers in Table I on page 7.

Exercise No. 229

Multiplying Three Figures by One

We are now ready to start the mental multiplication of numbers of three places by numbers of one place. Work from left to right. Immediately name the first partial product as hundreds or thousands. Thus, taking the fourth example, this would be calculated as 800, 900, 902. The fifth example would be figured as 1000, 1120, 1124.

When dealing with numbers in the thousands be sure to consider the thousands as such and not as so many hundreds. If you wish, however, you may shorten the terminology. You may, for instance, think of one thousand one hundred twenty-six simply as one, one twenty-six, or as one, one two six.

Perform mentally the following multiplications.

1. 121 × 2
2. 232 × 2
3. 343 × 2
4. 451 × 2
5. 562 × 2
6. 623 × 2
7. 731 × 2
8. 842 × 2
9. 953 × 2
10. 161 × 2
11. 222 × 2
12. 333 × 2
13. 441 × 2
14. 552 × 2

15. 663 × 2
16. 721 × 2
17. 832 × 2
18. 943 × 2
19. 151 × 2
20. 262 × 2

Exercise No. 230

Factoring

Factor the numbers from 577 to 605 inclusive in the form shown in the table on page 152.

Exercise No. 231

Mental Division

Divide mentally by 22 the answers to Exercise No. 179 as given on page 173. Compare your answers with Table I on page 7.

Exercise No. 232

Mental Multiplication

Multiply mentally by 110 the numbers in Table I on page 7.

Exercise No. 233

Multiplying Three Figures by One

Perform mentally the following multiplications.

1. 131 × 3
2. 242 × 3
3. 353 × 3
4. 464 × 3
5. 571 × 3
6. 632 × 3
7. 743 × 3
8. 854 × 3

9. 961 × 3
10. 172 × 3
11. 233 × 3
12. 344 × 3
13. 451 × 3
14. 562 × 3
15. 673 × 3
16. 734 × 3
17. 841 × 3
18. 952 × 3
19. 163 × 3
20. 274 × 3

Exercise No. 234

Factoring

Factor the numbers from 593 to 625 inclusive in the form shown in the table on pages 152 and 153.

Exercise No. 235

Mental Division

Divide mentally by 23 the answers to Exercise No. 186 as given on pages 173 and 174. Compare your answers with Table I on page 7.

Exercise No. 236

Mental Multiplication

Multiply mentally by 120 the numbers in Table I on page 7.

Exercise No. 237

Multiplying Three Figures by One

Perform mentally the following multiplications.
1. 141 × 4
2. 252 × 4

3. 363 × 4
4. 474 × 4
5. 585 × 4
6. 641 × 4
7. 752 × 4
8. 863 × 4
9. 974 × 4
10. 185 × 4
11. 241 × 4
12. 352 × 4
13. 463 × 4
14. 574 × 4
15. 685 × 4
16. 741 × 4
17. 852 × 4
18. 963 × 4
19. 174 × 4
20. 285 × 4

Exercise No. 238

Mental Division

Divide mentally by 24 the answers to Exercise No. 193 as given on page 174. Compare your answers with Table I on page 7.

Exercise No. 239

Mental Multiplication

Multiply mentally by 130 the numbers in Table I on page 7.

Exercise No. 240

Multiplying Three Figures by One

Perform mentally the following multiplications.

1. 151 × 5
2. 262 × 5
3. 373 × 5

4. 484 × 5
5. 595 × 5
6. 656 × 5
7. 761 × 5
8. 872 × 5
9. 983 × 5
10. 194 × 5
11. 255 × 5
12. 366 × 5
13. 471 × 5
14. 582 × 5
15. 693 × 5
16. 754 × 5
17. 865 × 5
18. 976 × 5
19. 181 × 5
20. 292 × 5

Exercise No. 241

Mental Division

Divide mentally by 25 the answers to Exercise No. 200 as given on pages 174 and 175. Compare your answers with Table I on page 7.

Exercise No. 242

Mental Multiplication

Multiply mentally by 140 the numbers in Table I on page 7.

Exercise No. 243

Multiplying Three Figures by One

Perform mentally the following multiplications.

1. 141 × 6
2. 252 × 6
3. 363 × 6
4. 474 × 6

5. 585 × 6
6. 696 × 6
7. 747 × 6
8. 851 × 6
9. 962 × 6
10. 173 × 6
11. 284 × 6
12. 395 × 6
13. 446 × 6
14. 557 × 6
15. 661 × 6
16. 772 × 6
17. 883 × 6
18. 994 × 6
19. 145 × 6
20. 256 × 6

Exercise No. 244

Mental Multiplication

Multiply mentally by 150 the numbers in Table I on page 7.

Exercise No. 245

Multiplying Three Figures by One

Perform mentally the following multiplications.

1. 131 × 7
2. 242 × 7
3. 353 × 7
4. 464 × 7
5. 575 × 7
6. 686 × 7
7. 797 × 7
8. 838 × 7
9. 941 × 7
10. 152 × 7
11. 263 × 7

12. 374 × 7
13. 485 × 7
14. 596 × 7
15. 637 × 7
16. 748 × 7
17. 851 × 7
18. 962 × 7
19. 173 × 7
20. 284 × 7

Exercise No. 246

Mental Multiplication

Multiply mentally by 160 the numbers in Table I on page 7.

Exercise No. 247

Multiplying Three Figures by One

Perform mentally the following multiplications.

1. 141 × 8
2. 252 × 8
3. 363 × 8
4. 474 × 8
5. 585 × 8
6. 696 × 8
7. 747 × 8
8. 858 × 8
9. 969 × 8
10. 171 × 8
11. 282 × 8
12. 393 × 8
13. 444 × 8
14. 555 × 8
15. 666 × 8
16. 777 × 8
17. 888 × 8
18. 999 × 8

19. 741 × 8
20. 652 × 8

FRACTIONS IN GENERAL

The multiplication or the division of fractions will present no difficulty to the student of these pages since it is simply a matter of combining operations in which he is well practised.

What needs more particular attention is the addition and subtraction of the kinds of fractions most commonly encountered in practical work in office, shop and home. The average person would immediately reach for a pencil if asked the sum of $\frac{3}{4}$ and $\frac{5}{6}$ or the difference between $1\frac{1}{3}$ and $\frac{3}{8}$. Yet a little practice with calculations of this kind makes it very easy to perform them mentally.

The succeeding examples in addition and subtraction of fractions are based on the possible combinations of two fractions of the-orders of halves, quarters, eighths, sixteenths, thirds, sixths, twelfths, fifths and tenths.

These exercises are to stimulate memory and rapid thinking. No instructions are given as to how to perform them because it is assumed that the student is familiar with the reduction of fractions to a common denominator.

Exercise No. 248

Reduction of Fractions

1. Reduce to eighths: $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$
2. Reduce to sixteenths: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$
3. Reduce to sixths: $\frac{1}{3}$, $\frac{1}{2}$, $\frac{2}{3}$
4. Reduce to twelfths: $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$
5. Reduce to twenty-fourths: $\frac{1}{12}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{5}{12}$, $\frac{1}{2}$, $\frac{7}{12}$, $\frac{5}{8}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{11}{12}$
6. Reduce to tenths: $\frac{1}{5}$, $\frac{2}{5}$, $\frac{1}{2}$, $\frac{3}{5}$, $\frac{4}{5}$
7. Reduce to twentieths: $\frac{1}{10}$, $\frac{1}{5}$, $\frac{3}{10}$, $\frac{2}{5}$, $\frac{1}{2}$, $\frac{3}{5}$, $\frac{7}{10}$, $\frac{4}{5}$, $\frac{9}{10}$
8. Reduce to fortieths: $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{5}$, $\frac{1}{4}$, $\frac{3}{10}$, $\frac{3}{8}$, $\frac{2}{5}$, $\frac{1}{2}$, $\frac{3}{5}$, $\frac{5}{8}$, $\frac{7}{10}$, $\frac{3}{4}$, $\frac{4}{5}$, $\frac{7}{8}$, $\frac{9}{10}$
9. Reduce to fifteenths: $\frac{1}{3}$, $\frac{1}{3}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{2}{3}$, $\frac{4}{5}$
10. Reduce to thirtieths: $\frac{1}{10}$, $\frac{1}{6}$, $\frac{1}{5}$, $\frac{3}{10}$, $\frac{1}{3}$, $\frac{2}{5}$, $\frac{1}{2}$, $\frac{3}{5}$, $\frac{2}{3}$, $\frac{7}{10}$, $\frac{4}{5}$, $\frac{5}{6}$, $\frac{9}{10}$

Exercise No. 249

Mental Multiplication

Multiply mentally by 170 the numbers in Table I on page 7.

Exercise No. 250

Addition of Fractions

Add the following mentally.

1. $\frac{1}{2} + \frac{1}{4}$
2. $\frac{1}{2} + \frac{3}{4}$
3. $\frac{1}{2} + \frac{1}{8}$
4. $\frac{1}{2} + \frac{3}{8}$
5. $\frac{1}{2} + \frac{5}{8}$
6. $\frac{1}{2} + \frac{7}{8}$
7. $\frac{1}{4} + \frac{1}{8}$
8. $\frac{1}{4} + \frac{3}{8}$
9. $\frac{1}{4} + \frac{5}{8}$
10. $\frac{1}{4} + \frac{7}{8}$
11. $\frac{3}{4} + \frac{1}{8}$
12. $\frac{3}{4} + \frac{3}{8}$
13. $\frac{3}{4} + \frac{5}{8}$
14. $\frac{3}{4} + \frac{7}{8}$
15. $\frac{1}{2} + \frac{1}{16}$
16. $\frac{1}{2} + \frac{3}{16}$
17. $\frac{1}{2} + \frac{5}{16}$
18. $\frac{1}{2} + \frac{7}{16}$
19. $\frac{1}{2} + \frac{9}{16}$
20. $\frac{1}{2} + \frac{11}{16}$
21. $\frac{1}{2} + \frac{13}{16}$
22. $\frac{1}{2} + \frac{15}{16}$
23. $\frac{1}{4} + \frac{1}{16}$
24. $\frac{1}{4} + \frac{3}{16}$
25. $\frac{1}{4} + \frac{5}{16}$
26. $\frac{1}{4} + \frac{7}{16}$
27. $\frac{1}{4} + \frac{9}{16}$
28. $\frac{1}{4} + \frac{11}{16}$
29. $\frac{1}{4} + \frac{13}{16}$
30. $\frac{1}{4} + \frac{15}{16}$
31. $\frac{3}{4} + \frac{1}{16}$
32. $\frac{3}{4} + \frac{3}{16}$
33. $\frac{3}{4} + \frac{5}{16}$
34. $\frac{3}{4} + \frac{7}{16}$
35. $\frac{3}{4} + \frac{9}{16}$

36. $\frac{3}{4} + \frac{11}{16}$
37. $\frac{3}{4} + \frac{15}{16}$
38. $\frac{1}{8} + \frac{1}{16}$
39. $\frac{1}{8} + \frac{3}{16}$
40. $\frac{1}{8} + \frac{3}{16}$

Exercise No. 251

Multiplying Three Figures by One

1. 152 × 9
2. 263 × 9
3. 374 × 9
4. 485 × 9
5. 96 × 9
6. 647 × 9
7. 758 × 9
8. 869 × 9
9. 973 × 9
10. 184 × 9
11. 295 × 9
12. 346 × 9
13. 457 × 9
14. 568 × 9
15. 679 × 9
16. 784 × 9
17. 895 × 9
18. 946 × 9
19. 157 × 9
20. 268 × 9

Exercise No. 252

Mental Division

Divide mentally by 2 the answers to Exercise No. 229 as given on page 175.

Exercise No. 253

Addition of Fractions

Do the last thirty examples in Exercise No. 250 on the preceding page, and also add the following.

1. $\frac{1}{8} + \frac{5}{16}$
2. $\frac{1}{8} + \frac{7}{16}$
3. $\frac{1}{8} + \frac{9}{16}$
4. $\frac{1}{8} + \frac{11}{16}$
5. $\frac{1}{8} + \frac{13}{16}$
6. $\frac{1}{8} + \frac{15}{16}$
7. $\frac{3}{8} + \frac{1}{16}$
8. $\frac{3}{8} + \frac{3}{16}$
9. $\frac{3}{8} + \frac{5}{16}$
10. $\frac{3}{8} + \frac{7}{16}$

Exercise No. 254

Mental Multiplication

Multiply mentally by 180 the numbers in Table I on page 7.

Exercise No. 255

Mental Division

Divide mentally by 3 the answers to Exercise No. 233 as given on page 175. Compare your answers with Exercise **No. 233.**

Exercise No. 256

Addition of Fractions

Review the last twenty examples in Exercise No. 250 on page 97 and those in Exercise No. 253 on page 98 . Also add the following.

1. $\frac{3}{8} + \frac{9}{16}$
2. $\frac{3}{8} + \frac{11}{16}$
3. $\frac{3}{8} + \frac{13}{16}$
4. $\frac{3}{8} + \frac{15}{16}$
5. $\frac{5}{8} + \frac{1}{16}$
6. $\frac{5}{8} + \frac{5}{16}$
7. $\frac{5}{8} + \frac{5}{16}$

8. $\frac{5}{8} + \frac{7}{16}$
9. $\frac{5}{8} + \frac{9}{16}$
10. $\frac{5}{8} + \frac{11}{16}$

Exercise No. 257

Mental Multiplication

Multiply mentally by 190 the numbers in Table I on page 7.

Exercise No. 258

Mental Division

Divide mentally by 4 the answers to Exercise No. 237 as given on page 175.

Exercise No. 259

Addition of Fractions

Review the last ten examples in Exercise No. 250 on page 97 , as well as those in Exercise No. 253 on page 98 and Exercise No. 256 on page 98 . Also add the following.

1. $\frac{5}{8} + \frac{13}{16}$
2. $\frac{5}{8} + \frac{15}{16}$
3. $\frac{7}{8} + \frac{1}{16}$
4. $\frac{7}{8} + \frac{3}{16}$
5. $\frac{7}{8} + \frac{5}{16}$
6. $\frac{7}{8} + \frac{7}{16}$
7. $\frac{7}{8} + \frac{9}{16}$
8. $\frac{7}{8} + \frac{11}{16}$
9. $\frac{7}{8} + \frac{13}{16}$
10. $\frac{7}{8} + \frac{15}{16}$

Exercise No. 260

Mental Multiplication

Multiply mentally by 200 the numbers in Table I on page 7 .

Exercise No. 261

Addition of Fractions

Review the examples in Exercise No. 253 on page 98 , No. 256 on page 98 and No. 259 above. Also add the following.

1. $\frac{1}{3} + \frac{1}{6}$
2. $\frac{2}{3} + \frac{1}{6}$
3. $\frac{1}{3} + \frac{1}{12}$
4. $\frac{1}{3} + \frac{5}{12}$
5. $\frac{1}{3} + \frac{7}{12}$
6. $\frac{1}{3} + \frac{11}{12}$
7. $\frac{2}{3} + \frac{1}{12}$
8. $\frac{2}{3} + \frac{5}{12}$
9. $\frac{2}{3} + \frac{7}{12}$
10. $\frac{2}{3} + \frac{11}{12}$

Exercise No. 262

Mental Division

Divide mentally by 5 the answers to Exercise No. 240 as given on page 175.

Exercise No. 263

Subtraction of Fractions

Perform mentally the following subtractions.

1. $\frac{3}{4} - \frac{1}{2}$
2. $1\frac{1}{4} - \frac{1}{2}$
3. $\frac{5}{8} - \frac{1}{2}$
4. $\frac{7}{8} - \frac{1}{2}$
5. $1\frac{1}{8} - \frac{1}{2}$
6. $1\frac{3}{8} - \frac{1}{2}$
7. $\frac{3}{8} - \frac{1}{4}$
8. $\frac{5}{8} - \frac{1}{4}$
9. $\frac{7}{8} - \frac{1}{4}$
10. $1\frac{1}{8} - \frac{1}{4}$
11. $\frac{7}{8} - \frac{3}{4}$
12. $1\frac{1}{8} - \frac{3}{4}$
13. $1\frac{3}{8} - \frac{3}{4}$

14. $1\frac{5}{8} - \frac{3}{4}$
15. $\frac{9}{16} - \frac{1}{2}$
16. $\frac{11}{16} - \frac{1}{2}$
17. $\frac{13}{16} - \frac{1}{2}$
18. $\frac{15}{16} - \frac{1}{2}$
19. $1\frac{1}{16} - \frac{1}{2}$
20. $1\frac{3}{16} - \frac{1}{2}$
21. $1\frac{5}{16} - \frac{1}{2}$
22. $1\frac{7}{16} - \frac{1}{2}$
23. $\frac{5}{16} - \frac{1}{4}$
24. $\frac{7}{16} - \frac{1}{4}$
25. $\frac{9}{16} - \frac{1}{4}$
26. $\frac{11}{16} - \frac{1}{4}$
27. $\frac{13}{16} - \frac{1}{4}$
28. $\frac{15}{16} - \frac{1}{4}$
29. $1\frac{1}{16} - \frac{1}{4}$
30. $1\frac{3}{16} - \frac{1}{4}$

Exercise No. 264

Mental Multiplication

Multiply mentally by 210 the numbers in Table I on page 7.

Exercise No. 265

Subtraction of Fractions

Review the last twenty examples in Exercise No. 263 above, and also perform the following subtractions.

1. $\frac{13}{16} - \frac{3}{4}$
2. $\frac{15}{16} - \frac{3}{4}$
3. $1\frac{1}{16} - \frac{3}{4}$
4. $1\frac{3}{16} - \frac{3}{4}$
5. $1\frac{5}{16} - \frac{3}{4}$
6. $1\frac{7}{16} - \frac{3}{4}$
7. $1\frac{9}{16} - \frac{3}{4}$
8. $1\frac{11}{16} - \frac{3}{4}$
9. $\frac{3}{16} - \frac{1}{8}$

10. $\frac{5}{16} - \frac{1}{8}$

Exercise No. 266

Mental Division

Divide mentally by 6 the answers to Exercise No. 243 as given on page 175.

Exercise No. 267

Addition of Fractions

Review the examples in Exercise No. 256 on page 98 , No. 259 on page 99 and No. 261 on page 99 . Also perform the following additions.

1. $\frac{1}{6} + \frac{1}{12}$
2. $\frac{1}{6} + \frac{5}{12}$
3. $\frac{1}{6} + \frac{7}{12}$
4. $\frac{1}{6} + \frac{11}{12}$
5. $\frac{5}{6} + \frac{1}{12}$
6. $\frac{5}{6} + \frac{5}{12}$
7. $\frac{5}{6} + \frac{7}{12}$
8. $\frac{5}{6} + \frac{11}{12}$
9. $\frac{1}{2} + \frac{1}{3}$
10. $\frac{1}{2} + \frac{2}{3}$

Exercise No. 268

Mental Multiplication

Multiply mentally by 220 the numbers in Table I on page **7**.

Exercise No. 269

Subtraction of Fractions

Review the last ten examples in Exercise No. 263 on page 100 and No. 265 on page 100. Also perform the following subtractions.

1. $\frac{7}{16} - \frac{1}{8}$
2. $\frac{9}{16} - \frac{1}{8}$
3. $\frac{11}{16} - \frac{1}{8}$

4. $\frac{13}{16} - \frac{1}{8}$
5. $\frac{15}{16} - \frac{1}{8}$
6. $1\frac{1}{16} - \frac{1}{8}$
7. $\frac{7}{16} - \frac{3}{8}$
8. $\frac{9}{16} - \frac{3}{8}$
9. $\frac{11}{16} - \frac{3}{8}$
10. $\frac{13}{16} - \frac{3}{8}$

Exercise No. 270

Mental Division

Divide mentally by 7 the answers to Exercise No. 245 as given on page 176.

Exercise No. 271

Addition of Fractions

Review the examples in Exercise No. 259 on page 99 , No. **261**on page 99 and No. 267 on page 101. Also perform the following additions.

1. $\frac{1}{2} + \frac{1}{6}$
2. $\frac{1}{2} + \frac{5}{6}$
3. $\frac{1}{4} + \frac{1}{6}$
4. $\frac{1}{4} + \frac{5}{6}$
5. $\frac{3}{4} + \frac{1}{6}$
6. $\frac{3}{4} + \frac{5}{6}$
7. $\frac{1}{8} + \frac{1}{6}$
8. $\frac{3}{8} + \frac{1}{6}$
9. $\frac{5}{8} + \frac{1}{6}$
10. $\frac{7}{8} + \frac{1}{6}$

Exercise No. 272

Mental Multiplication

Multiply mentally by 230 the numbers in Table I on page 7.

Exercise No. 273

Subtraction of Fractions

Review the examples in Exercise No. 265 on page 100 and No. 269 on page 101. Also perform the following subtractions.

1. $\frac{15}{16} - \frac{3}{8}$
2. $1\frac{1}{16} - \frac{3}{8}$
3. $1\frac{3}{16} - \frac{3}{8}$
4. $1\frac{5}{16} - \frac{3}{8}$
5. $\frac{11}{16} - \frac{5}{8}$
6. $\frac{13}{16} - \frac{5}{8}$
7. $\frac{15}{16} - \frac{5}{8}$
8. $1\frac{1}{16} - \frac{5}{8}$
9. $1\frac{3}{16} - \frac{5}{8}$
10. $1\frac{5}{16} - \frac{5}{8}$

Exercise No. 274

Mental Division

Divide mentally by 8 the answers to Exercise No. 247 as given on page 176.

Exercise No. 275

Addition of Fractions

Review the examples in Exercise No. 261 on page 99 , No. 267 on page 101 and No. 271 on this page. Also perform the following additions.

1. $\frac{1}{8} + \frac{5}{6}$
2. $\frac{3}{8} + \frac{5}{6}$
3. $\frac{5}{8} + \frac{5}{6}$
4. $\frac{7}{8} + \frac{5}{6}$
5. $\frac{1}{2} + \frac{1}{12}$
6. $\frac{1}{2} + \frac{5}{12}$
7. $\frac{1}{2} + \frac{7}{12}$
8. $\frac{1}{2} + \frac{11}{12}$
9. $\frac{1}{4} + \frac{1}{12}$
10. $\frac{1}{4} + \frac{5}{12}$

Exercise No. 276

Mental Multiplication

Multiply mentally by 240 the numbers in Table I on page 7.

Exercise No. 277

Subtraction of Fractions

Review the examples in Exercise No. 269 on page 101 and No. 273 on page 102. Also perform the following.

1. $1\frac{7}{16} - \frac{5}{8}$
2. $1\frac{9}{16} - \frac{5}{8}$
3. $\frac{15}{16} - \frac{7}{8}$
4. $1\frac{1}{16} - \frac{7}{8}$
5. $1\frac{3}{16} - \frac{7}{8}$
6. $1\frac{5}{16} - \frac{7}{8}$
7. $1\frac{7}{16} - \frac{7}{8}$
8. $1\frac{9}{16} - \frac{7}{8}$
9. $1\frac{11}{16} - \frac{7}{8}$
10. $1\frac{13}{16} - \frac{7}{8}$

Exercise No. 278

Mental Division

Divide mentally by 9 the answers to Exercise No. 251 as given on page 176.

Exercise No. 279

Addition of Fractions

Review the examples in Exercise No. 267 on page 101, No. 271 on page 102 and No. 275 on this page. Also perform the following additions.

1. $\frac{1}{4} + \frac{7}{12}$
2. $\frac{1}{4} + \frac{11}{12}$
3. $\frac{3}{4} + \frac{1}{12}$
4. $\frac{3}{4} + \frac{5}{12}$
5. $\frac{3}{4} + \frac{7}{12}$
6. $\frac{3}{4} + \frac{11}{12}$
7. $\frac{1}{8} + \frac{1}{12}$
8. $\frac{1}{8} + \frac{5}{12}$
9. $\frac{1}{8} + \frac{7}{12}$

10. $\frac{1}{8} + \frac{11}{12}$

Exercise No. 280

Mental Multiplication

Multiply mentally by 250 the numbers in Table I on page 7.

Exercise No. 281

Subtraction of Fractions

Review the examples in Exercise No. 273 on page 102 and No. 277 on page 103.Also perform the following subtractions.

1. $\frac{1}{2} - \frac{1}{3}$
2. $\frac{5}{6} - \frac{2}{3}$
3. $\frac{5}{12} - \frac{1}{3}$
4. $\frac{3}{4} - \frac{1}{3}$
5. $\frac{11}{12} - \frac{1}{3}$
6. $1\frac{1}{4} - \frac{1}{3}$
7. $\frac{3}{4} - \frac{2}{3}$
8. $1\frac{1}{12} - \frac{2}{3}$
9. $1\frac{1}{4} - \frac{2}{3}$
10. $1\frac{7}{12} - \frac{2}{3}$

Exercise No. 282

Mental Division

Divide mentally the following. Express remainders as such instead of as fractions.

1. 328 ÷ 121
2. 593 ÷ 232
3. 794 ÷ 343
4. 1249 ÷ 451
5. 1580 ÷ 562
6. 1835 ÷ 623
7. 1774 ÷ 731
8. 1786 ÷ 842
9. 2114 ÷ 953

10. 439 ÷ 161
11. 406 ÷ 131
12. 776 ÷ 242
13. 1164 ÷ 353
14. 1574 ÷ 464
15. 1998 ÷ 571
16. 690 ÷ 141
17. 1208 ÷ 252
18. 1704 ÷ 363
19. 2178 ÷ 474
20. 2620 ÷ 585

Exercise No. 283

Addition of Fractions

Review the examples in Exercise No. 271 on page 102, No. 275 on page 103 and No. 279 on page 103. Also perform the following additions.

1. $\frac{3}{8} + \frac{1}{12}$
2. $\frac{3}{8} + \frac{5}{12}$
3. $\frac{3}{8} + \frac{7}{12}$
4. $\frac{3}{8} + \frac{11}{12}$
5. $\frac{5}{8} + \frac{1}{12}$
6. $\frac{5}{8} + \frac{5}{12}$
7. $\frac{5}{8} + \frac{7}{12}$
8. $\frac{5}{8} + \frac{11}{12}$
9. $\frac{7}{8} + \frac{13}{12}$
10. $\frac{7}{8} + \frac{5}{12}$

Exercise No. 284

Multiplying Two Figures by Two

With this exercise we start the general multiplication of two numbers of two places each. You have had some experience with such numbers in using the numbers up to 25 as direct multipliers. In the succeeding exercises, however, the multipliers are greater than 25 and the operation is performed differently.

Multiply the whole of the multiplicand by the first figure of the multiplier; next multiply the whole of the multiplicand by the second figure of the

multiplier; and finally add the two partial products.

When you multiply the first figure of the multiplicand by the first figure of the multiplier you will get a number of either three places, as in the first example (where 20 × 40 produces 800), or four places, as in the second example (where 2 × 5 produces 10). Add to this first result as you work along from left to right. Similarly, when you multiply the first figure of the multiplicand by the second figure of the multiplier, you will get a number of either two or three places.

Repeat to yourself the original example and the partial products as often as you find necessary. The need for such repetitions will grow less as you become more practised.

Taking the first example: repeat, 41 × 26, 41 × 26, 41 × 26. 40 × 20 is 800, 1 × 2 is 2, 820. (say 1 × 2 rather than 1 × 20 because the former method is simpler when dealing with large numbers. When you think of the 2 as following the 8 it of course becomes a 20 in the product.) Repeat 820, 820, 820. 40 × 6 is 240, 1 × 6 is 6, 246. Repeat 820 + 246, 820 + 246, 820 + 246. Add: 1020, 1060, 1066.

The second example is performed: 1000, 1020; 350, 357. 1020 + 357, 1320, 1370, 1377.

Most of the examples in this exercise are very simple and there can be no objection to your shortening the method given, which is a general method applicable to increasingly larger numbers. Thus in the examples illustrated you should be able to note at a glance that the first partial products are 820 and 1020.

1. 41 × 26
2. 51 × 27
3. 61 × 28
4. 71 × 29
5. 81 × 31
6. 91 × 32
7. 31 × 33
8. 41 × 34
9. 51 × 26
10. 61 × 27
11. 71 × 28
12. 81 × 29
13. 91 × 31
14. 31 × 32
15. 41 × 33

16. 51 × 34
17. 61 × 26
18. 71 × 27
19. 81 × 28
20. 91 × 29

Exercise No. 285

Subtraction of Fractions

Review the examples in Exercise No. 277 on page 103 and No. 281 on page 104. Also perform the following subtractions.

1. $\frac{1}{4} - \frac{1}{6}$
2. $\frac{7}{12} - \frac{1}{6}$
3. $\frac{3}{4} - \frac{1}{6}$
4. $1\frac{1}{12} - \frac{1}{6}$
5. $\frac{11}{12} - \frac{5}{6}$
6. $1\frac{1}{4} - \frac{5}{6}$
7. $1\frac{5}{12} - \frac{5}{6}$
8. $1\frac{3}{4} - \frac{5}{6}$
9. $\frac{5}{6} - \frac{1}{2}$
10. $1\frac{1}{6} - \frac{1}{2}$

Exercise No. 286

Mental Division

Divide mentally the following.

1. 445 ÷ 222
2. 695 ÷ 333
3. 1258 ÷ 441
4. 1655 ÷ 552
5. 1700 ÷ 663
6. 2274 ÷ 632
7. 2747 ÷ 743
8. 3242 ÷ 854
9. 3747 ÷ 961
10. 533 ÷ 172
11. 2830 ÷ 641

12. 3233 ÷ 752
13. 3624 ÷ 863
14. 3989 ÷ 974
15. 902 ÷ 185
16. 845 ÷ 151
17. 1440 ÷ 262
18. 2013 ÷ 373
19. 2564 ÷ 484
20. 3094 ÷ 595

Exercise No. 287

Addition of Fractions

Review the examples in Exercise No. 275 on page 103, No. 279 on page 103 and No. 283 on page 104.Also perform the following additions.

1. $\frac{7}{8} + \frac{7}{12}$
2. $\frac{7}{8} + \frac{11}{12}$
3. $\frac{1}{5} + \frac{1}{10}$
4. $\frac{1}{5} + \frac{3}{10}$
5. $\frac{1}{5} + \frac{7}{10}$
6. $\frac{1}{5} + \frac{9}{10}$
7. $\frac{2}{5} + \frac{1}{10}$
8. $\frac{2}{5} + \frac{3}{10}$
9. $\frac{2}{5} + \frac{7}{10}$
10. $\frac{2}{5} + \frac{9}{10}$

Exercise No. 288

Multiplying Two Figures by Two

In doing exercises of this type always use the second number as the multiplier. Using the first example to illustrate, find 30 times 42 and then 5 times 42; do not work the other way around by finding 40 times 35 and then 2 times 35. This caution is given because of the special way in which the exercises are graded.

1. 42 × 35
2. 52 × 36
3. 62 × 37
4. 72 × 38

5. 82 × 39
6. 92 × 41
7. 32 × 42
8. 42 × 43
9. 52 × 35
10. 62 × 36
11. 72 × 37
12. 82 × 38
13. 92 × 39
14. 32 × 41
15. 42 × 42
16. 52 × 43
17. 62 × 34
18. 72 × 35
19. 82 × 36
20. 92 × 37

Exercise No. 289

Subtraction of Fractions

Review the examples in Exercise No. 277 on page **103** and No. 281 on page **104.** Also perform the following subtractions.

1. $\frac{2}{3} - \frac{1}{2}$
2. $1\frac{1}{3} - \frac{1}{2}$
3. $\frac{5}{12} - \frac{1}{4}$
4. $1\frac{1}{24} - \frac{1}{4}$
5. $1\frac{1}{12} - \frac{3}{4}$
6. $1\frac{7}{12} - \frac{3}{4}$
7. $\frac{7}{24} - \frac{1}{8}$
8. $\frac{13}{24} - \frac{3}{8}$
9. $\frac{19}{24} - \frac{5}{8}$
10. $1\frac{1}{24} - \frac{7}{8}$

Exercise No. 290

Mental Division

1. 1479 ÷ 721

2. 2435 ÷ 832
3. 2036 ÷943
4. 387 ÷ 151
5. 623 ÷ 262
6. 745 ÷ 233
7. 1134 ÷ 344
8. 1523 ÷ 451
9. 1966 ÷ 562
10. 2421 ÷ 673
11. 1156 ÷ 211
12. 1643 ÷ 352
13. 2128 ÷ 463
14. 2581 ÷ 574
15. 3012 ÷ 685
16. 3347 ÷ 656
17. 4498 ÷ 761
18. 4924 ÷ 872
19. 5547 ÷ 983
20. 1067 ÷ 194

Exercise No. 291

Addition of Fractions

Review the examples in Exercise **No. 279 on** page 103, **No. 283 on** page **104 and No. 287 on page 107. Also perform the following additions.**

1. $\frac{3}{5} + \frac{1}{10}$
2. $\frac{3}{5} + \frac{3}{10}$
3. $\frac{3}{5} + \frac{7}{10}$
4. $\frac{3}{5} + \frac{9}{10}$
5. $\frac{4}{5} + \frac{1}{10}$
6. $\frac{4}{5} + \frac{3}{10}$
7. $\frac{4}{5} + \frac{7}{10}$
8. $\frac{4}{5} + \frac{9}{10}$
9. $\frac{1}{2} + \frac{1}{5}$
10. $\frac{1}{2} + \frac{2}{5}$

Exercise No. 292

Mental Multiplicati

Mental Multiplication

Multiply mentally the following.

1. 43 × 44
2. 53 × 45
3. 63 × 46
4. 73 × 47
5. 83 × 48
6. 93 × 49
7. 33 × 51
8. 43 × 52
9. 53 × 44
10. 63 × 45
11. 73 × 46
12. 83 × 47
13. 93 × 48
14. 33 × 49
15. 43 × 51
16. 53 × 52
17. 63 × 44
18. 78 × 45
19. 83 × 46
20. 93 × 47

Exercise No. 293

Subtraction of Fractions

Review the examples in Exercise No. 281 on page 104 and No. 289 on page 108. Also do the following.

1. $\frac{23}{24} - \frac{1}{8}$
2. $1\frac{5}{24} - \frac{3}{8}$
3. $1\frac{11}{24} - \frac{5}{8}$
4. $1\frac{17}{24} - \frac{7}{8}$
5. $\frac{7}{12} - \frac{1}{2}$
6. $\frac{11}{12} - \frac{1}{2}$
7. $1\frac{1}{12} - \frac{1}{2}$
8. $1\frac{5}{12} - \frac{1}{2}$
9. $\frac{1}{3} - \frac{1}{4}$
10. $\frac{2}{3} - \frac{1}{4}$

Exercise No. 294

Mental Division

Divide mentally the following.

1. 444 ÷ 131
2. 795 ÷ 242
3. 1154 ÷ 353
4. 1424 ÷ 464
5. 1767 ÷ 571
6. 3186 ÷ 740
7. 3493 ÷ 852
8. 4716 ÷ 963
9. 815 ÷ 174
10. 1348 ÷ 285
11. 1421 ÷ 255
12. 2118 ÷ 366
13. 2676 ÷ 471
14. 3375 ÷ 582
15. 3573 ÷ 693
16. 971 ÷ 141
17. 1712 ÷ 252
18. 2255 ÷ 363
19. 2955 ÷ 474
20. 3820 ÷ 585

Exercise No. 295

Addition of Fractions

Review the examples in Exercise No. 279 on page 103, No. 283 on page 104 and No. 292 on page 108. Also perform the following additions.

1. $\frac{1}{2} + \frac{3}{5}$
2. $\frac{1}{2} + \frac{4}{5}$
3. $\frac{1}{2} + \frac{1}{10}$
4. $\frac{1}{2} + \frac{3}{10}$
5. $\frac{1}{2} + \frac{7}{10}$
6. $\frac{1}{2} + \frac{9}{10}$
7. $\frac{1}{4} + \frac{1}{5}$
8. $\frac{1}{4} + \frac{2}{5}$

9. $\frac{1}{4} + \frac{3}{5}$
10. $\frac{1}{4} + \frac{4}{5}$

Exercise No. 296

Mental Multiplication

Multiply mentally the following.

1. 44 × 53
2. 54 × 54
3. 64 × 55
4. 74 × 56
5. 84 × 57
6. 94 × 58
7. 34 × 59
8. 44 × 61
9. 54 × 53
10. 64 × 54
11. 74 × 55
12. 84 × 56
13. 94 × 57
14. 34 × 58
15. 44 × 59
16. 59 × 61
17. 64 × 53
18. 74 × 54
19. 84 × 55
20. 94 × 56

Exercise No. 297

Subtraction of Fractions

Review the examples in Exercise No. 289 on page 108 and No. 293 on page 109. Also perform the following subtractions.

1. $\frac{5}{6} - \frac{1}{4}$
2. $1\frac{1}{6} - \frac{1}{4}$
3. $\frac{5}{6} - \frac{3}{4}$
4. $1\frac{1}{6} - \frac{3}{4}$

5. $1\frac{1}{3} - \frac{3}{4}$
6. $1\frac{2}{3} - \frac{3}{4}$
7. $\frac{5}{24} - \frac{1}{8}$
8. $\frac{13}{24} - \frac{1}{8}$
9. $\frac{17}{24} - \frac{1}{8}$
10. $1\frac{1}{24} - \frac{1}{8}$

Exercise No. 298

Mental Division

Divide mentally the following.

1. 3989 ÷ 754
2. 4967 ÷ 865
3. 5192 ÷ 976
4. 1002 ÷ 181
5. 1566 ÷ 292
6. 4486 ÷ 696
7. 4632 ÷ 747
8. 5206 ÷ 851
9. 6381 ÷ 962
10. 1153 ÷ 173
11. 982 ÷ 131
12. 1829 ÷ 242
13. 2706 ÷ 353
14. 3433 ÷ 464
15. 4089 ÷ 575
16. 1200 ÷ 141
17. 2141 ÷ 252
18. 3084 ÷ 363
19. 4152 ÷ 474
20. 5101 ÷ 585

Exercise No. 299

Addition of Fractions

Review the examples in Exercise No. 283 on page **104,** No. 292 on page 108 and No. 295 on page 109. Also perform the following additions.

1. $\frac{1}{4} + \frac{1}{10}$
2. $\frac{1}{4} + \frac{3}{10}$
3. $\frac{1}{4} + \frac{7}{10}$
4. $\frac{1}{4} + \frac{9}{10}$
5. $\frac{3}{4} + \frac{1}{5}$
6. $\frac{3}{4} + \frac{2}{5}$
7. $\frac{3}{4} + \frac{2}{5}$
8. $\frac{3}{4} + \frac{4}{5}$
9. $\frac{3}{4} + \frac{1}{10}$
10. $\frac{3}{4} + \frac{3}{10}$

Exercise No. 300

Mental Multiplication

Multiply mentally the following.

1. 45 × 62
2. 55 × 63
3. 65 × 64
4. 75 × 65
5. 85 × 66
6. 95 × 67
7. 35 × 68
8. 45 × 69
9. 55 × 62
10. 65 × 63
11. 75 × 64
12. 85 × 65
13. 95 × 66
14. 35 × 67
15. 45 × 68
16. 55 × 69
17. 65 × 62
18. 75 × 63
19. 85 × 64
20. 95 × 65

Exercise No. 301

Subtraction of Fractions

Review the examples in Exercise No. 293 on page 109 and No. 297 on page 110. Also perform the following subtractions.

1. $\frac{11}{24} - \frac{3}{8}$
2. $\frac{19}{24} - \frac{2}{8}$
3. $\frac{23}{24} - \frac{3}{8}$
4. $1\frac{7}{24} - \frac{3}{8}$
5. $\frac{17}{24} - \frac{5}{8}$
6. $1\frac{11}{24} - \frac{5}{8}$
7. $1\frac{5}{24} - \frac{5}{8}$
8. $1\frac{13}{24} - \frac{5}{8}$
9. $\frac{23}{24} - \frac{7}{8}$
10. $1\frac{7}{24} - \frac{7}{8}$

Exercise No. 302

Mental Division

Divide mentally the following.

1. 1714 ÷ 284
2. 2399 ÷ 395
3. 2714 ÷ 446
4. 3507 ÷ 557
5. 4617 ÷ 661
6. 5303 ÷ 686
7. 5886 ÷ 797
8. 6665 ÷ 838
9. 7233 ÷ 941
10. 1084 ÷ 152
11. 5757 ÷ 696
12. 6588 ÷ 747
13. 7189 ÷ 858
14. 8238 ÷ 969
15. 1385 ÷ 171
16. 1493 ÷ 152
17. 2502 ÷ 263
18. 3440 ÷ 374
19. 4450 ÷ 485
20. 5423 ÷ 596

Exercise No. 303

Addition of Fractions

Review the examples in Exercise No. 292 on page 108, No. 295 on page 109 and No. 299 on page 111. Also perform the following additions.

1. $\frac{3}{4} + \frac{7}{10}$
2. $\frac{3}{4} + \frac{9}{10}$
3. $\frac{1}{8} + \frac{1}{5}$
4. $\frac{1}{8} + \frac{2}{5}$
5. $\frac{1}{8} + \frac{3}{5}$
6. $\frac{1}{8} + \frac{4}{5}$
7. $\frac{1}{8} + \frac{1}{10}$
8. $\frac{1}{8} + \frac{3}{10}$
9. $\frac{1}{8} + \frac{7}{10}$
10. $\frac{1}{8} + \frac{9}{10}$

Exercise No. 304

Mental Multiplication

Multiply mentally the following.

1. 46 × 71
2. 56 × 72
3. 66 × 73
4. 76 × 74
5. 86 × 75
6. 96 × 76
7. 36 × 77
8. 46 × 78
9. 56 × 71
10. 66 × 72
11. 76 × 73
12. 86 × 74
13. 96 × 75
14. 36 × 76
15. 46 × 77
16. 56 × 78
17. 66 × 71
18. 76 × 72

19. 86 × 73
20. 96 × 74

Exercise No. 305

Subtraction of Fractions

Review the examples in Exercise No. 297 on page 110 and No. 301 on page 111. Also perform the following subtractions.

1. $1\frac{11}{24} - \frac{7}{8}$
2. $1\frac{19}{24} - \frac{7}{8}$
3. $\frac{3}{10} - \frac{1}{5}$
4. $\frac{1}{2} - \frac{1}{5}$
5. $\frac{9}{10} - \frac{1}{5}$
6. $1\frac{1}{10} - \frac{1}{5}$
7. $\frac{1}{2} - \frac{2}{5}$
8. $\frac{7}{10} - \frac{2}{5}$
9. $1\frac{1}{10} - \frac{2}{5}$
10. $1\frac{3}{10} - \frac{2}{5}$

Exercise No. 306

Mental Division

Divide mentally the following.

1. 5338 ÷ 772
2. 5393 ÷ 883
3. 6001 ÷ 994
4. 908 ÷ 145
5. 1576 ÷ 256
6. 1859 ÷ 263
7. 2736 ÷ 374
8. 3606 ÷ 485
9. 4518 ÷ 596
10. 4711 ÷ 637
11. 2284 ÷ 282
12. 3183 ÷ 393
13. 3956 ÷ 444
14. 4795 ÷ 555

15. 5954 ÷ 666
16. 5887 ÷ 647
17. 7123 ÷ 758
18. 8221 ÷ 869
19. 9257 ÷ 973
20. 1721 ÷ 184

Exercise No. 307

Addition of Fractions

Review the examples in Exercise No. 295 on page 109, No. 297 on page 110 and No. 303 on page 112. Also perform the following additions.

1. $\frac{3}{8} + \frac{1}{8}$
2. $\frac{3}{8} + \frac{2}{5}$
3. $\frac{3}{8} + \frac{3}{5}$
4. $\frac{3}{8} + \frac{4}{5}$
5. $\frac{3}{8} + \frac{1}{10}$
6. $\frac{3}{8} + \frac{3}{10}$
7. $\frac{3}{8} + \frac{7}{10}$
8. $\frac{3}{8} + \frac{9}{10}$
9. $\frac{5}{8} + \frac{1}{5}$
10. $\frac{5}{8} + \frac{2}{5}$

Exercise No. 308

Mental Multiplication

Perform mentally the following multiplications.

1. 47 × 79
2. 57 × 81
3. 67 × 82
4. 77 × 83
5. 87 × 84
6. 97 × 85
7. 37 × 86
8. 47 × 87
9. 57 × 79
10. 67 × 81

11. 77 × 82
12. 87 × 83
13. 97 × 84
14. 37 × 85
15. 47 × 86
16. 57 × 87
17. 67 × 79
18. 77 × 81
19. 87 × 82
20. 97 × 83

Exercise No. 309

Subtraction of Fractions

Review the examples in Exercise No. 301 on page 111 and No. 305 on page 112. Also perform the following subtractions.

1. $\frac{7}{10} - \frac{3}{5}$
2. $\frac{9}{10} - \frac{3}{5}$
3. $1\frac{3}{10} - \frac{3}{5}$
4. $1\frac{1}{2} - \frac{3}{5}$
5. $\frac{9}{10} - \frac{4}{5}$
6. $1\frac{1}{10} - \frac{4}{5}$
7. $1\frac{1}{2} - \frac{4}{5}$
8. $1\frac{7}{10} - \frac{4}{5}$
9. $\frac{7}{10} - \frac{1}{2}$
10. $\frac{9}{10} - \frac{1}{2}$

Exercise No. 310

Mental Division

Divide mentally the following.

1. 5365 ÷ 748
2. 6599 ÷ 851
3. 7445 ÷ 962
4. 1243 ÷ 173
5. 2220 ÷ 284
6. 6293 ÷ 777

7. 7548 ÷ 888
8. 8304 ÷ 999
9. 6075 ÷ 741
10. 5241 ÷ 652
11. 2682 ÷ 295
12. 3411 ÷ 346
13. 4471 ÷ 457
14. 5667 ÷ 568
15. 6720 ÷ 679
16. 7831 ÷ 784
17. 8917 ÷ 895
18. 9441 ÷ 946
19. 1563 ÷ 157
20. 2627 ÷ 268

Exercise No. 311

Addition of Fractions

Review the examples in Exercise No. 297 on page 110, No. 303 on page 112 and No. 307 on page 113. Also add the following.

1. $\frac{5}{8} + \frac{3}{5}$
2. $\frac{5}{8} + \frac{4}{5}$
3. $\frac{5}{8} + \frac{1}{10}$
4. $\frac{5}{8} + \frac{3}{10}$
5. $\frac{5}{8} + \frac{7}{10}$
6. $\frac{5}{8} + \frac{9}{10}$
7. $\frac{7}{8} + \frac{1}{5}$
8. $\frac{7}{8} + \frac{2}{5}$
9. $\frac{7}{8} + \frac{3}{5}$
10. $\frac{7}{8} + \frac{4}{5}$

Exercise No. 312

Mental Multiplication

Multiply mentally the following.

1. 48 × 88
2. 58 × 89

3. 68 × 91
4. 78 × 92
5. 88 × 93
6. 98 × 94
7. 38 × 95
8. 48 × 96
9. 58 × 88
10. 68 × 89
11. 78 × 91
12. 88 × 92
13. 98 × 93
14. 38 × 94
15. 48 × 95
16. 58 × 96
17. 68 × 88
18. 78 × 89
19. 88 × 91
20. 98 × 92

Exercise No. 313

Subtraction of Fractions

Review the examples in Exercise No. 305 on page 112 and No. 309 on page 114. Also perform the following subtractions.

1. $1\frac{1}{10} - \frac{1}{2}$
2. $1\frac{3}{10} - \frac{1}{2}$
3. $\frac{3}{5} - \frac{1}{2}$
4. $\frac{4}{5} - \frac{1}{2}$
5. $1\frac{1}{5} - \frac{1}{2}$
6. $1\frac{2}{5} - \frac{1}{2}$
7. $\frac{9}{20} - \frac{1}{4}$
8. $\frac{13}{20} - \frac{1}{4}$
9. $\frac{17}{20} - \frac{1}{4}$
10. $1\frac{1}{20} - \frac{1}{4}$

Exercise No. 314

Addition of Fractions

Review the examples in Exercise No. 303 on page 112, No. 307 on page 113 and No. 311 on page 114. Also perform the following additions.

1. $\frac{7}{8} + \frac{1}{10}$
2. $\frac{7}{8} + \frac{3}{10}$
3. $\frac{7}{8} + \frac{7}{10}$
4. $\frac{7}{8} + \frac{9}{10}$
5. $\frac{1}{3} + \frac{1}{5}$
6. $\frac{1}{3} + \frac{2}{5}$
7. $\frac{1}{3} + \frac{3}{5}$
8. $\frac{1}{3} + \frac{4}{5}$
9. $\frac{1}{3} + \frac{1}{10}$
10. $\frac{1}{3} + \frac{3}{10}$

Exercise No. 315

Mental Multiplication

Multiply the following mentally.

1. 49 × 95
2. 59 × 96
3. 69 × 97
4. 79 × 98
5. 89 × 99
6. 99 × 95
7. 39 × 96
8. 49 × 97
9. 59 × 98
10. 69 × 99
11. 79 × 95
12. 89 × 96
13. 99 × 97
14. 39 × 98
15. 49 × 99
16. 59 × 95
17. 69 × 96
18. 79 × 97
19. 89 × 98
20. 99 × 99

Exercise No. 316

Subtraction of Fractions

Review the examples in Exercise No. 309 on page 114 and No. 313 on page 115. Also perform the following subtractions.

1. $\frac{7}{20} - \frac{1}{4}$
2. $\frac{11}{20} - \frac{1}{4}$
3. $\frac{19}{20} - \frac{1}{4}$
4. $1\frac{3}{20} - \frac{1}{4}$
5. $\frac{19}{20} - \frac{3}{4}$
6. $1\frac{3}{20} - \frac{3}{4}$
7. $1\frac{7}{20} - \frac{3}{4}$
8. $1\frac{11}{20} - \frac{3}{4}$
9. $\frac{17}{20} - \frac{3}{4}$
10. $1\frac{1}{20} - \frac{3}{4}$

Exercise No. 317

Addition of Fractions

Review the examples in Exercise No. 307 on page **113,**No. 311 on page 114 and No. 314 on page 115. Also perform the following additions.

1. $\frac{1}{3} + \frac{7}{10}$
2. $\frac{1}{3} + \frac{9}{10}$
3. $\frac{2}{3} + \frac{1}{5}$
4. $\frac{2}{3} + \frac{2}{5}$
5. $\frac{2}{3} + \frac{3}{5}$
6. $\frac{2}{3} + \frac{4}{5}$
7. $\frac{2}{3} + \frac{1}{10}$
8. $\frac{2}{3} + \frac{3}{10}$
9. $\frac{2}{3} + \frac{7}{10}$
10. $\frac{2}{3} + \frac{9}{10}$

Exercise No. 318

Subtraction of Fractions

Review the examples in Exercise No. 313 on page 115 and No. 316 on this page. Also perform the following subtractions.

1. $1\frac{9}{20} - \frac{3}{4}$

2. $1\frac{13}{20} - \frac{3}{4}$
3. $\frac{13}{40} - \frac{1}{8}$
4. $\frac{21}{40} - \frac{1}{8}$
5. $\frac{29}{40} - \frac{1}{8}$
6. $\frac{37}{40} - \frac{1}{8}$
7. $\frac{9}{40} - \frac{1}{8}$
8. $\frac{17}{40} - \frac{1}{8}$
9. $\frac{33}{40} - \frac{1}{8}$
10. $1\frac{1}{40} - \frac{1}{8}$

Exercise No. 319

Mental Division

Divide the following mentally.

1. 1066 ÷ 26
2. 1377 ÷ 27
3. 1708 ÷ 28
4. 2059 ÷ 29
5. 2511 ÷ 31
6. 2912 ÷ 32
7. 1023 ÷ 33
8. 1394 ÷ 34
9. 1326 ÷ 26
10. 1647 ÷ 27
11. 1988 ÷ 28
12. 2349 ÷ 29
13. 2821 ÷ 31
14. 992 ÷ 32
15. 1353 ÷ 33
16. 1734 ÷ 34
17. 1586 ÷ 26
18. 1917 ÷ 27
19. 2268 ÷ 28
20. 2639 ÷ 29

Exercise No. 320

Addition of Fractions

Review the examples in Exercise No. 311 on page 114, No. 314 on page 115 and No. 315 on page 115. Also perform the following additions.

1. $\frac{1}{6} + \frac{1}{5}$
2. $\frac{1}{6} + \frac{2}{5}$
3. $\frac{1}{6} + \frac{3}{5}$
4. $\frac{1}{6} + \frac{4}{5}$
5. $\frac{1}{6} + \frac{1}{10}$
6. $\frac{1}{6} + \frac{3}{10}$
7. $\frac{1}{6} + \frac{7}{10}$
8. $\frac{1}{6} + \frac{9}{10}$
9. $\frac{5}{6} + \frac{1}{5}$
10. $\frac{5}{6} + \frac{2}{5}$

Exercise No. 321

Subtraction of Fractions

Review the examples in Exercise No. 314 on page 115, No. 316 on page 116 and No. 320 above. Also perform the following subtractions.

1. $\frac{23}{40} - \frac{3}{8}$
2. $\frac{31}{40} - \frac{3}{8}$
3. $\frac{39}{40} - \frac{3}{8}$
4. $1\frac{7}{40} - \frac{3}{8}$
5. $\frac{19}{40} - \frac{3}{8}$
6. $\frac{27}{40} - \frac{3}{8}$
7. $1\frac{3}{40} - \frac{3}{8}$
8. $1\frac{11}{40} - \frac{3}{8}$
9. $\frac{33}{40} - \frac{5}{8}$
10. $1\frac{1}{40} - \frac{5}{8}$

Exercise No. 322

Mental Division

Divide the following mentally.

1. 1470 ÷ 35
2. 1872 ÷ 36
3. 2294 ÷ 37
4. 2736 ÷ 38

5. 3198 ÷ 39
6. 3772 ÷ 41
7. 1344 ÷ 42
8. 1806 ÷ 43
9. 1820 ÷ 35
10. 2232 ÷ 36
11. 2664 ÷ 37
12. 3116 ÷ 38
13. 3588 ÷ 39
14. 1312 ÷ 41
15. 1764 ÷ 42
16. 2236 ÷ 43
17. 2108 ÷ 34
18. 2520 ÷ 35
19. 2952 ÷ 36
20. 3404 ÷ 37

Exercise No. 323

Addition of Fractions

Review the examples in Exercise No. 314 on page 115, No. 317 on page 116 and No. 320 on page 117. Also perform the following additions.

1. $\frac{5}{6} + \frac{3}{5}$
2. $\frac{5}{6} + \frac{4}{5}$
3. $\frac{5}{6} + \frac{1}{10}$
4. $\frac{5}{6} + \frac{3}{10}$
5. $\frac{5}{6} + \frac{7}{10}$
6. $\frac{5}{6} + \frac{9}{10}$

Exercise No. 324

Subtraction of Fractions

Review the examples in Exercise No. 318 on page 116 and No. 321 on page 117. Also perform the following subtractions.

1. $1\frac{9}{40} - \frac{5}{8}$
2. $1\frac{17}{40} - \frac{5}{8}$
3. $\frac{29}{40} - \frac{5}{8}$

4. $\frac{37}{40} - \frac{5}{8}$
5. $1\frac{11}{40} - \frac{5}{8}$
6. $1\frac{21}{40} - \frac{5}{8}$
7. $1\frac{3}{40} - \frac{7}{8}$
8. $1\frac{11}{40} - \frac{7}{8}$
9. $1\frac{19}{40} - \frac{7}{8}$
10. $1\frac{27}{40} - \frac{7}{8}$

Exercise No. 325

Mental Division

Divide the following mentally.

1. 1892 ÷ 44
2. 2385 ÷ 45
3. 2898 ÷ 46
4. 3431 ÷ 47
5. 3984 ÷ 48
6. 4557 ÷ 49
7. 1683 ÷ 51
8. 2236 ÷ 52
9. 2332 ÷ 44
10. 2835 ÷ 45
11. 3358 ÷ 46
12. 3901 ÷ 47
13. 4464 ÷ 48
14. 1617 ÷ 49
15. 2193 ÷ 51
16. 2756 ÷ 52
17. 2772 ÷ 44
18. 3285 ÷ 45
19. 3818 ÷ 46
20. 4371 ÷ 47

Exercise No. 326

Addition of Fractions

Review the examples in Exercise No. 317 on page 116, No. 320 on page 117

and No. 323 on this page.

Exercise No. 327

Subtraction of Fractions

Review the examples in Exercise No. 321 on page 117 and No. 324 on page 118. Also perform the following subtractions.

1. $\frac{39}{40} - \frac{7}{8}$
2. $1\frac{7}{40} - \frac{7}{8}$
3. $1\frac{33}{40} - \frac{7}{8}$
4. $1\frac{31}{40} - \frac{7}{8}$
5. $\frac{8}{15} - \frac{1}{3}$
6. $\frac{11}{15} - \frac{1}{3}$
7. $\frac{14}{15} - \frac{1}{3}$
8. $1\frac{2}{15} - \frac{1}{3}$
9. $\frac{13}{30} - \frac{1}{3}$
10. $\frac{19}{30} - \frac{1}{3}$

Exercise No. 328

Mental Division

Divide the following mentally.

1. 2332 ÷ 53
2. 2916 ÷ 54
3. 3520 ÷ 55
4. 4144 ÷ 56
5. 4788 ÷ 57
6. 5452 ÷ 58
7. 2006 ÷ 59
8. 2684 ÷ 61
9. 2862 ÷ 53
10. 3456 ÷ 54
11. 4070 ÷ 55
12. 4704 ÷ 56
13. 5358 ÷ 57
14. 1972 ÷ 58
15. 2596 ÷ 59

16. 3294 ÷ 61
17. 3392 ÷ 53
18. 3996 ÷ 54
19. 4620 ÷ 55
20. 5264 ÷ 56

Exercise No. 329

Addition of Fractions

Review the examples in Exercise No. 320 on page 117 and 323 on page 118.

Exercise No. 330

Subtraction of Fractions

Review the examples in Exercise No. 321 on page 117 and No. 324 on page 118. Also perform the following subtractions.

1. $1\frac{1}{30} - \frac{1}{3}$
2. $1\frac{7}{30} - \frac{1}{3}$
3. $\frac{13}{15} - \frac{2}{3}$
4. $1\frac{1}{15} - \frac{2}{3}$
5. $1\frac{4}{15} - \frac{2}{3}$
6. $1\frac{7}{15} - \frac{2}{3}$
7. $\frac{23}{30} - \frac{2}{3}$
8. $\frac{29}{30} - \frac{2}{3}$
9. $1\frac{11}{30} - \frac{2}{3}$
10. $1\frac{17}{30} - \frac{2}{3}$

Exercise No. 331

Mental Division

Divide the following mentally.

1. 2790 ÷ 62
2. 3465 ÷ 63
3. 4160 ÷ 64
4. 4875 ÷ 65
5. 5610 ÷ 66
6. 6365 ÷ 67

7. 2380 ÷ 68
8. 3105 ÷ 69
9. 3410 ÷ 62
10. 4095 ÷ 63
11. 4800 ÷ 64
12. 5525 ÷ 65
13. 6270 ÷ 66
14. 2345 ÷ 67
15. 3060 ÷ 68
16. 3795 ÷ 69
17. 4030 ÷ 62
18. 4725 ÷ 63
19. 5440 ÷ 64
20. 6175 ÷ 65

Exercise No. 332

Mental Division

Divide the following mentally.

1. 3266 ÷ 71
2. 4032 ÷ 72
3. 4818 ÷ 73
4. 5624 ÷ 74
5. 6450 ÷ 75
6. 7296 ÷ 76
7. 2772 ÷ 77
8. 3588 ÷ 78
9. 3976 ÷ 71
10. 4752 ÷ 72
11. 5548 ÷ 73
12. 6364 ÷ 74
13. 7200 ÷ 75
14. 2736 ÷ 76
15. 3542 ÷ 77
16. 4368 ÷ 78
17. 4686 ÷ 71
18. 5472 ÷ 72
19. 6278 ÷ 73

20. 7104 ÷ 74

Exercise No. 333

Subtraction of Fractions

Review the examples in Exercise No. 324 on page 118 and No. 330 on page 119. Also perform the following subtractions.

1. $\frac{11}{30} - \frac{1}{6}$
2. $\frac{17}{30} - \frac{1}{6}$
3. $\frac{23}{30} - \frac{1}{6}$
4. $\frac{29}{30} - \frac{1}{6}$
5. $\frac{4}{15} - \frac{1}{6}$
6. $\frac{7}{15} - \frac{1}{6}$
7. $\frac{13}{15} - \frac{1}{6}$
8. $1\frac{1}{15} - \frac{1}{6}$
9. $1\frac{1}{30} - \frac{5}{6}$
10. $1\frac{7}{30} - \frac{5}{6}$

Exercise No. 334

Mental Division

Divide the following mentally.

1. 3713 ÷ 79
2. 4617 ÷ 81
3. 5494 ÷ 82
4. 6391 ÷ 83
5. 7308 ÷ 84
6. 8245 ÷ 85
7. 3182 ÷ 86
8. 4089 ÷ 87
9. 4503 ÷ 79
10. 5427 ÷ 81
11. 6314 ÷ 82
12. 7221 ÷ 83
13. 8148 ÷ 84
14. 3145 ÷ 85
15. 4042 ÷ 86

16. 4959 ÷ 87
17. 5293 ÷ 79
18. 6237 ÷ 81
19. 7134 ÷ 82
20. 8051 ÷ 83

Exercise No. 335

Subtraction of Fractions

Review the examples in Exercise No. 330 on page 119 and No. 333 on page 120. Also perform the following subtractions.

1. $1\frac{13}{30} - \frac{5}{6}$
2. $1\frac{19}{30} - \frac{5}{6}$
3. $\frac{14}{15} - \frac{5}{6}$
4. $1\frac{2}{15} - \frac{5}{6}$
5. $1\frac{8}{15} - \frac{5}{6}$
6. $1\frac{11}{15} - \frac{5}{6}$

Exercise No. 336

Mental Division

Divide the following mentally.

1. 4224 ÷ 88
2. 5162 ÷ 89
3. 6188 ÷ 91
4. 7176 ÷ 92
5. 8184 ÷ 93
6. 9212 ÷ 94
7. 3610 ÷ 95
8. 4608 ÷ 96
9. 5104 ÷ 88
10. 6052 ÷ 89
11. 7098 ÷ 91
12. 8096 ÷ 92
13. 9114 ÷ 93
14. 3572 ÷ 94
15. 4560 ÷ 95

16. 5568 ÷ 96
17. 5984 ÷ 88
18. 6942 ÷ 89
19. 8008 ÷ 91
20. 9016 ÷ 92

Exercise No. 337

Mental Division

Divide the following mentally.

1. 4655 ÷ 95
2. 5664 ÷ 96
3. 6693 ÷ 97
4. 7742 ÷ 98
5. 8811 ÷ 99
6. 9405 ÷ 95
7. 3744 ÷ 96
8. 4753 ÷ 97
9. 5782 ÷ 98
10. 6831 ÷ 99
11. 7505 ÷ 95
12. 8544 ÷ 96
13. 9603 ÷ 97
14. 3822 ÷ 98
15. 4851 ÷ 99
16. 5605 ÷ 95
17. 6624 ÷ 96
18. 7663 ÷ 97
19. 8722 ÷ 98
20. 9801 ÷ 99

DECIMALS IN GENERAL

For the purposes of this book our interest in decimals centers in the equivalence of value between certain decimals and common fractions. Decimal parts of a number that may be represented as simple fractions of that number are known as *aliquot parts* of it. Thus, $12\frac{1}{2}$, 25 and $33\frac{1}{3}$ are aliquot parts of 100, being respectively equal to $\frac{1}{8}$, $\frac{1}{4}$ and $\frac{1}{3}$ of 100.

A knowledge of aliquot parts simplifies many arithmetical calculations. Thus if it be required to multiply 7928 by 25, the simplest way is to annex two 0's to 7928, making it 792800, and then divide by 4, since 25 is $\frac{1}{4}$ of 100. The answer, which may easily be figured mentally, comes to 198200.

Again, if we wanted to know the cost of 25 gross of penholders at $66\frac{2}{3}$¢ per dozen, we would figure that 1 gross costs $\$\frac{2}{3} \times 12$, or $8, and that 25 gross therefore cost $200.

Everybody with any degree of arithmetical training or experience is familiar with the equivalent decimal values for halves, quarters, eighths, thirds, sixths, fifths, tenths, twentieths, twenty-fifths and fiftieths. It is not difficult to extend the list of memorized values so as to include sixteenths and twelfths, and with this knowledge to make rapid calculations of values in thirty-seconds and twenty-fourths.

The succeeding exercises in decimals are designed toward this end. The student is drilled in representing the values of various fractions as decimals of an increasingly higher number of places. No tables are given because values are more quickly learned by repeated calculation than by any effort at mere memorization.

Exercise No. 338

Two-Place Decimal Values

Express the following fractions as decimals of two places. Use fractional terminations where necessary. Thus, $\frac{1}{3}$ expressed as a two-place decimal becomes $.33\frac{1}{3}$.

1. $\frac{1}{8}$
2. $\frac{3}{8}$
3. $\frac{5}{8}$

4. $\frac{7}{8}$
5. $\frac{1}{3}$
6. $\frac{2}{3}$
7. $\frac{1}{6}$
8. $\frac{5}{6}$
9. $\frac{1}{5}$
10. $\frac{2}{5}$
11. $\frac{3}{5}$
12. $\frac{4}{5}$

Repeat this exercise three times.

Exercise No. 339

Multiplying Three Figures by Two

Multiply mentally the following.

No new principles are involved in multiplications of this type. The student is simply asked to apply the methods which he has already learned to larger numbers.

1. 111 × 26
2. 222 × 27
3. 331 × 28
4. 442 × 29
5. 551 × 31
6. 612 × 32
7. 721 × 33
8. 832 × 34
9. 941 × 26
10. 152 × 27

Exercise No. 340

Two-Place Decimal Values

Review the examples in Exercise No. 338 above.

Express the following as decimals of two places.

1. $\frac{1}{16}$
2. $\frac{3}{16}$
3. $\frac{5}{16}$

4. $\frac{7}{16}$
5. $\frac{9}{16}$
6. $\frac{11}{16}$
7. $\frac{13}{16}$
8. $\frac{15}{16}$
9. $\frac{1}{12}$
10. $\frac{5}{12}$
11. $\frac{7}{12}$
12. $\frac{11}{12}$
13. $\frac{1}{32}$
14. $\frac{1}{64}$

Repeat this exercise three times.

Exercise No. 341

Multiplying Three Figures by Two

Multiply mentally the following.

1. 121 × 35
2. 232 × 36
3. 343 × 37
4. 451 × 38
5. 562 × 39
6. 623 × 41
7. 731 × 42
8. 842 × 43
9. 953 × 35
10. 161 × 36

SHORT CUTS

There are a number of devices for shortening the work of calculation in specific cases, though most of the methods usually included under this head have only a limited practical value because they are applicable only in highly special cases. A few methods, like horizontal addition and combined addition and subtraction have first-class utility. A variety of short cuts of varying degrees of value are given in the following pages without any attempt to classify them. The student should become familiar with all of them because there is always benefit in viewing numbers from as many angles as possible.

Exercise No. 342

Horizontal Addition

The term *horizontal addition* is applied to the adding of numbers that are not arranged in column form. There is often an unnecessary waste of time in arranging numbers in the form of columns. This is particularly true when the numbers to be added are on bills, invoices, etc. Values on such papers may be totalled by writing down each partial sum as it is arrived at, and then making a final addition.

Consider the first of the following examples. The sum of the units is 37, the sum of the tens is 45, etc. The sums of the various orders are successively set down in the form shown below, and then added.

$$\begin{array}{r} 37 \\ 45 \\ 14 \\ 16 \\ \hline 17887 \end{array}$$

The process might of course be shortened somewhat by adding two orders at a time.

Add the following.

1. $32 + $183 + $54 + $3486 + $569 + $9375 + $85 + $4103

2. $875 + $284 + $37 + $5200 + $398 + $62 + $74 + $2168 + $720

3. 763 + 827 + 49 + 5283 + 768 + 2175

4. 1536 + 8973 + 5178 + 926 + 8259 + 36 + 867

5. 9365 + 8375 + 1473 + 826 + 4123 + 15378

6. 986 + 325 + 7261 + 5820 + 569 + 8371
7. 6275 + 5183 + 985 + 3267 + 75 + 1528
8. 1738 + 9168 + 8273 + 5298 + 9 + 6832 + 65
9. $783.52 + $41.27 + $837.45 + $9681.73 + $48.26 + $912.78 + $91.75 + $683.12 + $41.83 + $591.87 + $291.83 + $758.32 + $58.67
10. 46235 + 8976 + 5807 + 98397 + 68325 + 892 + 5140 + 6839 + 326 + 2125

Exercise No. 343

Multiplying Three Figures by Two

Multiply mentally the following.

1. 131 × 44
2. 242 × 45
3. 353 × 46
4. 464 × 47
5. 571 × 48
6. 632 × 49
7. 743 × 51
8. 854 × 52
9. 961 × 44
10. 172 × 45

Exercise No. 344

Four-Place Decimal Values

Review the examples in Exercises No. 338 and 340 on page 123.

Express the fractions listed in Exercise No. 340 as decimals of four places. This is done by simply writing the value as parts of 100 of the terminal fractions of the proper two-place decimals. Thus, $\frac{1}{16}$, which is .06$\frac{1}{4}$ as a two-place decimal, becomes .0625 as a decimal of four places. Again, $\frac{1}{12}$ is .08$\frac{1}{3}$ or .0833 $\frac{1}{3}$.

Exercise No. 345

Multiplying Three Figures by Two

Multiply mentally the following.

1. 141 × 53
2. 252 × 54
3. 363 × 55
4. 474 × 56
5. 585 × 57
6. 641 × 58
7. 752 × 59
8. 863 × 61
9. 974 × 53
10. 185 × 54

Exercise No. 346

Combined Addition and Subtraction

It sometimes becomes necessary to subtract the sum of several numbers from a single number. If the numbers to be added are arranged in column form, this may be done at what amounts to one operation by a very simple process.

The numbers may be arranged either as a sum with a missing addend, as in the examples given for practice, or else with the minuend written at the top with underscoring and the difference written at the bottom, as in the examples shown for illustration.

The so-called carry method of subtraction is used. The sum of each successive column is subtracted from the corresponding figure of the minuend plus as many tens as may be necessary to make the subtraction possible. The number of tens thus used is then added to the next column.

To illustrate: from 122808 take the sum of 35635, and 68921.

$$\begin{array}{r} 122808 \\ \hline 35635 \\ 68921 \\ \hline 18252 \end{array}$$

The sum of 5 and 1 is subtracted from 8; write 2 and carry 0. Subtract 5 from 10; write 5 and carry 1 because 1 ten was used to make the subtraction possible. With 1 to carry, the next column adds to 16; subtract this from 18 and again carry 1. The next column adds to 14; subtract this from 22 and carry 2 because 2 tens were needed to make the subtraction possible in this case. Carrying 2 and subtracting from 12 gives the final necessary figure, 1.

The method of carrying may be made still more clear by taking an example that involves larger numbers; from 3744 subtract the sum of 366, 466, 566, 666, 766, 266 and 466.

```
 122808
 ------
  35635
  68921
 ------
  18252
```

The sum of the first column, 42, is subtracted from 44 because 44 is the next higher number ending in 4 from which a subtraction can be made; 4 is carried. The sum of the second column, 46, is subtracted from 54 because 54 is the next higher number ending in 4 from which a subtraction can be made; 5 is carried. The sum of the hundreds' column subtracted from 39 leaves 1.

In the following examples fill in in each case the missing number that will make all the numbers add to the total shown.

1.

```
$24.96
  6.24
  1.56
 12.48
   .98
  3.12
   (?)
-------
$149.18
```

2.

```
 6016
  376
  141
  188
 1504
  752
   (?)
------
105233
```

3.

```
$29.44
  7.36
  1.84
  3.68
 58.88
  1.38
   (?)
-------
$220.34
```

4.
6144
384
24576
3072
145
49152
(?)
181777

5.
864
108
81
5296
3456
432
(?)
11965

6.
$168.86
10.56
1.32
.96
2.64
84.48
(?)
$944.66

7.
$475.17
46.82
120.08
2461.50
500.07
1208.92
(?)
$12933.16

8.
$286.09
5304.62
20463.20
607.05
6315.46
73.90
(?)
$63452.87

Exercise No. 347

Multiplying Three Figures by Two

Multiplying Three Figures by Two

Multiply mentally the following.

1. 151 × 62
2. 262 × 63
3. 373 × 64
4. 484 × 65
5. 595 × 66
6. 656 × 67
7. 761 × 68
8. 872 × 69
9. 983 × 62
10. 194 × 63

Exercise No. 348

Five-Place Decimal Values

Review the examples in Exercises No. 338 and 340 on page 123 and No. 344 on page 126.

Express the following fractions as decimals of five places.

To find values in thirty-seconds, add .0312$\frac{1}{2}$ to the next lower value in sixteenths, etc. The calculation is clearer in the mind if both sixteenths and thirty-seconds are first thought of as decimals of four places. Changing the four-place answer to five places is the work of an instant.

To find values in twenty-fourths, add .0416$\frac{2}{3}$ to the next lower value in twelfths, etc. In writing answers, drop final $\frac{1}{3}$, and raise final $\frac{2}{3}$ to make the last figure a 7.

1. $\frac{1}{32}$
2. $\frac{3}{32}$
3. $\frac{5}{32}$
4. $\frac{7}{32}$
5. $\frac{9}{32}$
6. $\frac{11}{32}$
7. $\frac{13}{32}$
8. $\frac{15}{32}$
9. $\frac{17}{32}$
10. $\frac{19}{32}$
11. $\frac{21}{32}$
12. $\frac{23}{32}$

13. $\frac{25}{32}$
14. $\frac{27}{32}$
15. $\frac{29}{32}$
16. $\frac{31}{32}$
17. $\frac{1}{24}$
18. $\frac{5}{24}$
19. $\frac{7}{24}$
20. $\frac{11}{24}$
21. $\frac{13}{24}$
22. $\frac{17}{24}$
23. $\frac{19}{24}$
24. $\frac{23}{24}$

Exercise No. 349

Multiplying Three Figures by Two

Multiply mentally the following.

1. 141 × 71
2. 252 × 72
3. 363 × 73
4. 474 × 74
5. 585 × 75
6. 696 × 76
7. 747 × 77
8. 851 × 78
9. 962 × 71
10. 173 × 72

Exercise No. 350

Multiplying by a Near Number

It sometimes happens that a multiplier is a little more or a little less than 100, 1000, 10000, etc. In cases of this kind it is quickest to multiply by the round number and then add or subtract the necessary difference. For example, multiply $385.20 by 998. We multiply the dollar value by 1000 and subtract from this product twice $385.20, thus:

$385200
770.40

$384429.60

Multiply the following. The student should be able to do most of these mentally.

1. $425 × 999
2. $865 × 98
3. $735.25 × 998
4. $258.30 × 104
5. $827.58 × 1003
6. $516 × 1.02
7. $989 × 992
8. $99 × 97
9. $1005 × 1002

Exercise No. 351

Multiplying Three Figures by Two

Multiply mentally the following.

1. 131 × 79
2. 242 × 81
3. 353 × 82
4. 464 × 83
5. 575 × 84
6. 686 × 85
7. 797 × 86
8. 838 × 87
9. 941 × 79
10. 152 × 81

Exercise No. 352

Review of Decimals

Review the examples in Exercise No. 340 on page 123, No. 344 on page 126 and No. 348 on page 129.

Exercise No. 353

Multiplying Three Figures by Two

Multiply mentally the following.

1. 141 × 88
2. 252 × 89
3. 363 × 91
4. 474 × 92
5. 585 × 93
6. 696 × 94
7. 747 × 95
8. 858 × 96
9. 969 × 88
10. 171 × 89

Exercise No. 354

Aliquot Parts in Multiplication

Reference has already been made to the fact that multiplication may be simplified by considering one of the factors as an aliquot part of some number ending in two or more 0's. Thus, 628 × 25 would be solved by multiplying 628 by 100 and dividing by 4; the answer comes to 15700. Again, multiplying 56 × 75 would be done most quickly by taking $\frac{3}{4}$ of 56 and then multiplying by 100.

Perform the following multiplications by the method of aliquot parts.

1. $35 × 15
2. $42 × 18
3. $24 × 16
4. $18 × 45
5. $72 × 75
6. $36 × 25
7. $52 × 250
8. $42 × 350
9. $150 × 48
10. $64 × 25
11. $35 × 18
12. $28 × 450
13. $36 × 33§
14. $72 × 16§
15. $96 × 12§

Exercise No. 355

Multiplying Three Figures by Two

Multiply mentally the following. Do not use short cuts.

1. 152 × 95
2. 263 × 96
3. 374 × 97
4. 485 × 98
5. 596 × 99
6. 647 × 95
7. 758 × 96
8. 869 × 97
9. 973 × 98
10. 194 × 99

Exercise No. 356

Review of Decimals

Review the examples in Exercise No. 344 on page 126 and No. 348 on page 129.

Exercise No. 357

Multiplying Three Figures by Three

Multiply mentally the following. Add together the first two partial products before determining the third.

1. 111 × 101
2. 222 × 111
3. 331 × 121
4. 442 × 131
5. 551 × 141
6. 612 × 151
7. 721 × 161
8. 832 × 171
9. 941 × 181
10. 152 × 191

Exercise No. 358

Simplifying the Multiplier

Sometimes a multiplier is of such a nature that one part of it may be taken as an exact multiple of another. In such cases an operation is eliminated by making a single multiplication of the first-found partial product instead of two multiplications of the original multiplicand. In the example at the left above, the 18 in the multiplier is equal to 3 times the 6. We therefore multiply the first partial product by 3 instead of multiplying the original multiplicand by 18. In the example at the right, 56 being equal to 8 times 7, we multiply first by 8, placing the result in the proper position, and then multiply this partial product by 7.

2574	5462
186	856
15444	43696
46332	305872
478764	4675472

Multiply the following by this method.

1. $385.85 × 642
2. $742.50 × 328
3. $82615 × 729
4. $4265.25 × 255
5. $9541.12 × 546
6. $172.48 × 763
7. $2153.28 × 18624
8. $530.75 × 16412

Exercise No. 359

Multiplying Three Figures by Three

Multiply mentally the following.

1. 121 × 202
2. 232 × 212
3. 343 × 222
4. 451 × 232
5. 562 × 242
6. 623 × 252
7. 731 × 262

8. 842 × 272
9. 953 × 282
10. 161 × 292

Exercise No. 360

Review of Decimals

Review the examples in Exercise No. 348 on page 129.

Exercise No. 361

Multiplying Three Figures by Three

Multiply mentally the following.

1. 131 × 303
2. 242 × 313
3. 353 × 323
4. 464 × 333
5. 571 × 343
6. 632 × 353
7. 743 × 363
8. 854 × 373
9. 961 × 383
10. 172 × 393

Exercise No. 362

Multiplication by Factoring

When a multiplier can be taken as the product of two factors, it may be quicker to make separate multiplications by each of these factors than to proceed in the ordinary manner. Take the example 632 × 156. In the illustrations below, the one at the left shows the ordinary method. At the right the multiplier is split up into the factors 13 and 12; the multiplicand is multiplied by 13 and the result is then multiplied by 12.

632	632
156	13
3792	8216
3160	12
632	98592
98592	

Multiply the following by this method.

1. 759 × 182
2. 684 × 169
3. 327 × 228
4. 656 × 285
5. 309 × 289
6. 728 × 324
7. 542 × 221
8. 327 × 224
9. 986 × 196

Exercise No. 363

Multiplying Three Figures by Three

Multiply mentally the following.

1. 141 × 404
2. 252 × 414
3. 363 × 424
4. 474 × 434
5. 585 × 444
6. 641 × 454
7. 752 × 464
8. 863 × 474
9. 974 × 484
10. 185 × 494

Exercise No. 364

Factors Between 11 and 19

A quick way to calculate the product of two numbers between 11 and 19 is to add the units of one number to the whole of the other, annex 0 and add the

product of the units of both numbers. Thus, to multiply 16 × 18: 16 and 8 are 24; call this 240 and add 48, making 288. The same result would be reached by adding 6 to 18.

Multiply by this method:

1. 14 × 15
2. 18 × 19
3. 15 × 17
4. 15 × 16
5. 13 × 15
6. 13 × 19
7. 16 × 17
8. 14 × 16
9. 19 × 19

Exercise No. 365

Multiplying Three Figures by Three

Multiply mentally the following.

1. 151 × 505
2. 262 × 515
3. 373 × 525
4. 484 × 535
5. 595 × 545
6. 656 × 555
7. 761 × 565
8. 872 × 575
9. 983 × 585
10. 194 × 595

Exercise No. 366

Multiplying by 11

When the multiplicand consists of two figures the sum of which is less than 10, the product is found by writing the two figures of the multiplicand with their sum between them. Thus, to multiply 62 by 11 we write 6 and 2 with the sum of 6 and 2 between these figures, obtaining 682.

To multiply larger numbers by 11, apply the following rule. Beginning at the

right, write the units' figure of the multiplicand, then successively the units plus the tens, the tens plus the hundreds, the hundreds plus the thousands, etc., carrying wherever necessary, and ending with the highest order of the multiplicand, or the highest order plus the carrying figure. Thus, to multiply 4762 by 11: write 2; add 2 and 6 and write 8; add 6 and 7, write 3 and carry 1; add 7 and 4, increase it by the 1 carried, write 2 and carry 1; add this 1 to 4 and write 5. Answer, 52382.

Multiply the following by this method.

1. $5136 × 11
2. $72638 × 11
3. $514832 × 11
4. $37281.05 × 11
5. $41268.45 × 11
6. $3275.75 × 11
7. $48263.25 × 11
8. $94873.30 × 11

Exercise No. 367

Multiplying Three Figures by Three

Multiply mentally the following.

1. 141 × 606
2. 252 × 616
3. 363 × 626
4. 474 × 636
5. 585 × 646
6. 696 × 656
7. 747 × 666
8. 851 × 676
9. 962 × 686
10. 173 × 696

Exercise No. 368

Multiplying by 21, 31, 41, etc.

Setting down the product from right to left, write the units' figure of the multiplicand, then multiply each order of the multiplicand by the tens' figure of

the multiplier, increasing the result in each case by the next higher order of the multiplicand and any necessary carrying figure.

Example, multiply 387 by 41; write 7; multiply 7 by 4, add the 8 of the multiplicand, making 36, write 6 and carry 3; multiply 8 by 4, add the 3 of the multiplicand and the carried 3, making 38, write 8 and carry 3; multiply 3 by 4 and add the carried 3 making 15, write 15. Answer, 15867.

Multiply by this method:

1. $2735.50 × 51
2. $1824.75 × 81
3. $5104.30 × 31
4. $6238.65 × 21
5. $7415.40 × 61
6. $8291.25 × 91
7. $2134.15 × 71
8. $5827.80 × 41

Exercise No. 369

Multiplying Three Figures by Three

Multiply mentally the following.

1. 131 × 707
2. 242 × 717
3. 353 × 727
4. 464 × 737
5. 575 × 747
6. 686 × 757
7. 797 × 767
8. 838 × 777
9. 941 × 787
10. 152 × 797

Exercise No. 370

Squares of Numbers

The square of a number is the number multiplied by itself. Squares may be determined quickly if the given number is considered to be the sum of two

numbers. In algebra such a sum would ordinarily be taken as $a + b$ and its square would be $a^2 + 2\,ab + b^2$. In regular arithmetical cases a becomes the tens of the number and b the units. Thus, 25 is 20 + 5, and 146 is 140 + 6. The algebraic formula for the square of the sum of two numbers is expressed as the square of the first plus twice the product of the first by the second plus the square of the second. Thus, 25 squared is 20 × 20 (400) plus 2 × 20 × 5 (200) plus 5 × 5 (25); the total is 625.

In computing squares by this principle you may immediately annex the square of the second to the square of the first, and then add twice the product of the first by the second. Thus in squaring 25 you would immediately say 425, and then add to this 2 × 20 × 5 (200), making 625. In squaring 146 you immediately say 19636 and add to this 2 × 140 × 6 (1680), making 21316. Always allow two places for the square of the second. Thus in squaring 61 the first partial product is 3601, to which 120 is added to make 3721.

In squaring numbers on paper the following method will be found rapid where large numbers are involved. Set the given number down twice as if for regular multiplication. Assuming that it is considered to consist of tens and units, multiply units by units, write units in the result and carry the tens. Add the two given tens together, multiply this sum by the given units, add the carried figure, write tens in the result and carry hundreds. Multiply tens by tens, add the carried figure and write the result.

67	134	1613
67	134	1613
4489	17956	2601769

In the first illustrative example at the left, 7 × 7 = 49, write 9 and carry 4; 6 + 6 = 12, 12 × 7 = 84, 84 + 4 = 88, write 8 and carry 8; 6 × 6 = 36, 36 + 8 = 44.

In the second example, 4 × 4 = 16, write 6 and carry 1; 13 + 13 = 26, 26 × 4 = 104, 104 + 1 = 105, write 5 and carry 10; 13 × 13 = 169, 169 + 10 = 179, write 179.

The third example is worked somewhat differently because here the parts of the number are considered to be 1600 and 13. 13 × 13 = 169, write 69 (two figures) and carry 1; 16 + 16 = 32, 32 × 13 = 416, 416 + 1 = 417, write 17 and carry 4; 16 × 16 = 256, 256 + 4 = 260, write 260.

Find the squares of the following numbers. Do all the examples first by the first method, then by the second method.

1. 74
2. 93
3. 82
4. 64
5. 38
6. 112
7. 124
8. 146
9. 168
10. 197
11. 1112
12. 1213
13. 1314
14. 1516
15. 1719

Exercise No. 371

Multiplying Three Figures by Three

Multiply mentally the following.

1. 141 × 808
2. 252 × 818
3. 363 × 828
4. 474 × 838
5. 585 × 848
6. 696 × 858
7. 747 × 868
8. 858 × 878
9. 969 × 888
10. 171 × 898

Exercise No. 372

Multiplying When Units Are Alike

The following method is a variation of that explained in connection with the squaring of numbers.

47	613
67	913
3149	559669

In the illustration at the left, 7 × 7 = 49, write 9 and carry 4; 6 + 4 = 10, 10 × 7 = 70, 70 + 4 = 74, write 4 and carry 7; 4 × 6 = 24, 24 + 7 = 31, write 31.

In the illustration at the right, 13 × 13 = 169, write 69 and carry 1; 6 + 9 = 15, 15 × 13 = 195, 195 + 1 = 196, write 96 and carry 1; 6 × 9 = 54, 54 + 1 = 55, write 55.

Perform the following multiplications by this method.

1. 136 × 56
2. 159 × 79
3. 172 × 92
4. 195 × 115
5. 234 × 174
6. 217 × 197
7. 516 × 816
8. 714 × 314
9. 217 × 917

Exercise No. 373

Multiplying Three Figures by Three

1. 152 × 909
2. 263 × 919
3. 374 × 929
4. 485 × 939
5. 596 × 949
6. 647 × 959
7. 758 × 969
8. 869 × 979
9. 973 × 989
10. 184 × 999

Exercise No. 374

Multiplying When Tens or Hundreds Are Alike

This is a variation of the method explained in Exercise No. 372 above.

83	717
89	714
7387	511938

In the example on page 139,3 × 9 = 27, write 7 and carry 2; 3 + 9 = 12, 12 × 8 = 96, 96 + 2 = 98, write 8 and carry 9; 8 × 8 = 64, 64 + 9 = 73, write 73.

In the example on page 139, 17 × 14 = 238, write 38 and carry 2; 17 + 14 = 31,31 × 7 = 217, 217 + 2 = 219, write 19 and carry 2; 7 × 7 = 49, 49 + 2 = 51, write 51.

Multiply the following by this method.

1. 92 × 93
2. 62 × 65
3. 84 × 87
4. 92 × 97
5. 213 × 215
6. 321 × 312
7. 416 × 418
8. 509 × 519
9. 913 × 917

Exercise No. 375

Square of Numbers Ending in 5

If a number to be squared consists of tens and units, and if the units are 5, then twice the product of the first part by the second is equal to the given number of tens. Thus, in 25 × 25, 20 × 5 × 2 is equal to 20 × 10; in 35 × 35, 30 × 5 × 2 is equal to 30 × 10. Accordingly when dealing with numbers of this type we may at once annex 25 to the product of the given tens multiplied by one more than the given tens. That is to say, 25 × 25 = 625, in which the 6 represents 3 × 2; 35 × 35 = 1225 in which the 12 represents 4 × 3; 45 × 45 = 2025, in which the 20 represents 5 × 4, etc.

Find the squares of the following numbers by this method.

1. 45
2. 55
3. 65
4. 75
5. 85
6. 95

7. 115
8. 135
9. 155
10. 175
11. 195
12. 315
13. 335
14. 355
15. 375

Exercise No. 376

Multiplying Like Tens with Units Making 10

The principle explained above applies to any case in which the tens are alike and the sum of the units is 10. Thus the product of 46 × 44 is 2024. We arrive at this by multiplying 4 × 5, making 20, and writing after this the product of 4 × 6 or 24.

Multiply in this manner the following.

1. 23 × 27
2. 41 × 49
3. 36 × 34
4. 103 × 107
5. 112 × 118
6. 154 × 156
7. 178 × 172
8. 169 × 161
9. 192 × 198

Exercise No. 377

Squaring Numbers Ending in 25

When a number ends in 25, like 725 for instance, we may take it as the sum of two numbers of which one represents hundreds and the other tens and units. In such cases twice the product of the first part by the second is equal to 50 times the first part. The result of this multiplication is a certain number of thousands.

To find the square of 725 we first write 0625 after the square of 7, making 490625. To this we add as many thousands as are represented by 7 × 5. 490625

+ 35000 = 525625.

Another method of finding these squares is by setting the numbers down as in the following illustration.

$$\begin{array}{r} 725 \\ 725 \\ \hline 525625 \end{array}$$

At once write 625 as the square of 25. Multiply 7 by 5, write 5 and carry 3; multiply 7 by 7, add 3, write 52.

Find the square of the following numbers by both of the foregoing methods.

1. 525
2. 625
3. 825
4. 1025
5. 1225
6. 1325
7. 1625
8. 1725
9. 1825
10. 1925

Exercise No. 378

Multiplying a Sum by a Difference

The algebraic product of $a + b$ and $a — b$ is $a^2 — b^2$. When numbers to be multiplied can be expressed as the sum of and the difference between two numbers, the product equals the square of the first minus the square of the second. Thus 63 × 57 may be expressed as 60 + 3 multiplied by 60 — 3. The product equals 60 × 60 minus 3 × 3. This comes to 3600 — 9 or 3591.

There is no limit to the combinations of numbers for which this principle would hold true, but for practical purposes we may be satisfied to recognize those in which the units add to 10 and the tens have a difference of 1.

Multiply the following by this method.

1. 72 × 68
2. 83 × 77
3. 94 × 86

4. 101 × 119
5. 123 × 137
6. 146 × 154
7. 152 × 168
8. 173 × 187
9. 182 × 198

Exercise No. 379

Multiplying Mixed Numbers with Like Integers

When integers are alike in mixed numbers, as in $9\frac{1}{4} \times 9\frac{3}{4}$, their product is found by multiplying one integer by the other plus the sum of the two fractions; to this partial product add that obtained by multiplying together the two fractions.

$$\begin{array}{r} 9\frac{1}{4} \\ 9\frac{3}{4} \\ \hline 90\frac{3}{16} \end{array} \qquad \begin{array}{r} 8\frac{3}{4} \\ 8\frac{5}{6} \\ \hline 76\frac{2}{3} \\ \frac{5}{8} \\ \hline 77\frac{7}{24} \end{array}$$

In the illustrative example at the left, 9 is multiplied by $9 + \frac{1}{4} + \frac{3}{4}$, or 10. The product of this is 90, and to 90 is added the product of $\frac{1}{4}$ and $\frac{3}{4}$, or $\frac{3}{16}$.

In the second example 8 is multiplied by $8 + \frac{3}{4} + \frac{5}{6}$, or $9\frac{7}{12}$, producing $76\frac{2}{3}$. To this is added the product of $\frac{3}{4} \times \frac{5}{6}$, or $\frac{5}{8}$, making a total of $77\frac{7}{24}$.

Multiply the following.

1. $9\frac{1}{3} \times 9\frac{2}{3}$
2. $10\frac{3}{5} \times 10\frac{3}{5}$
3. $12\frac{5}{6} \times 12\frac{1}{2}$
4. $18\frac{1}{2} \times 18\frac{1}{3}$
5. $3\frac{1}{3} \times 3\frac{2}{3}$
6. $60\frac{3}{5} \times 60\frac{3}{4}$
7. $40\frac{3}{8} \times 40\frac{1}{4}$
8. $25\frac{3}{5} \times 25\frac{2}{5}$
9. $5\frac{1}{4} \times 5\frac{1}{2}$
10. $8\frac{3}{4} \times 8\frac{1}{3}$
11. $6\frac{5}{8} \times 6\frac{3}{8}$

12. $12\frac{1}{9} \times 12\frac{5}{9}$

Exercise No. 380

Multiplying by a Number Nearly Whole

Sometimes a multiplier lacks a single fractional unit of being a whole number. Examples would be $5\frac{2}{3}$, $6\frac{3}{4}$ and $7\frac{4}{5}$, which respectively lack $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{5}$ of being 6, 7 and 8. In cases of this kind raise the multiplier to the next larger whole number, and after multiplying the multiplicand by this number, subtract from the product the necessary fractional part of the multiplicand. Thus, to multiply 64 by $3\frac{7}{8}$, we multiply 64 by 4, obtaining 256, and from this we subtract $\frac{1}{8}$ of 64, or 8, arriving at a final result of 248.

Multiply by this method the following.

1. $48 \times 5\frac{3}{4}$
2. $75 \times 10\frac{2}{3}$
3. $136 \times 6\frac{5}{6}$
4. $250 \times 3\frac{4}{5}$
5. $522 \times 4\frac{8}{9}$
6. $672 \times 8\frac{6}{7}$
7. $180 \times 7\frac{9}{10}$
8. $720 \times 2\frac{11}{12}$
9. $342 \times 9\frac{5}{6}$

Exercise No. 381

Aliquot Parts in Division

The method of aliquot parts is as applicable to division as it is to multiplication. In ordinary cases we determine how many times the given divisor is contained exactly in some multiple of 10. We multiply the given dividend by the result of such division, and point off the product decimally in such a way as to express division by the proper multiple of 10. Thus, to divide 1840 by 25, we obtain a multiplier of 4 by dividing 25 into 100. Multiplying 1840 by 4 we get 7360, and dividing this decimally by 100 we obtain 73.60

$6375 \div 7\frac{1}{2}$

$$\begin{array}{r} 6375 \\ 2125 \\ \hline 850.0 \end{array}$$

Another method of using aliquot parts is illustrated by the example shown above. The problem is to divide 6375 by $7\frac{1}{2}$. We note that $7\frac{1}{2}$ lacks one-third of itself of being 10. We therefore add one-third of itself to 6375 and divide the resulting sum decimally by 10.

Divide by the foregoing methods:

1. 580 ÷ 25
2. 750 ÷ $16\frac{2}{3}$
3. 450 ÷ $12\frac{1}{2}$
4. 875 ÷ 250
5. 640÷ 125
6. 435÷ $33\frac{1}{3}$
7. 1527 ÷ 150
8. 918 ÷ 15
9. 582÷$7\frac{1}{2}$

Exercise No. 382

Cubes of Numbers

The algebraic formula for the cube of the sum of two numbers, *a* and *b*, is $a^3 + 3a^2b + 3ab^2 + b^3$. This may be expressed as the cube of the first plus three times the square of the first multiplied by the second, plus three times the first multiplied by the square of the second plus the cube of the second.

By applying this formula it is not difficult to calculate mentally the cubes of numbers of two places. Suppose, for instance, that we want to find the cube of 26. We immediately annex the cube of 6 (216) to the cube of 2 (8), obtaining 8216. (Always allow three places for the cube of the second.) Multiplying 3 × 400 (square of 20) × 6, we get 7200, which, added to 8216, makes 15416. Multiplying 3 × 20 × 36 (square of 6) we obtain 2160, which, added to 15416 gives 17576 as the cube of 26.

Cubes may be readily written down from right to left by using a different method.

26^3	$6 \times 6 \times 6 = 216$	6
17576	$(6 \times 6 \times 2 \times 3) + 21 = 237$	7
	$(6 \times 2 \times 2 \times 3) + 23 = 95$	5
	$(2 \times 2 \times 2) + 9 = 17$	17

All the necessary writing is shown on p.144 at the left. The method of making

the calculation is analyzed at the right. The cube of 6 is 216, write 6 and carry 21. The square of 6 (36) multiplied by 2 (72) multiplied by 3 (216) plus 21 comes to 237, write 7 and carry 23. The product of 6 times the square of 2 (24) multiplied by 3 (72) plus 23 comes to 95, write 5 and carry 9. The cube of 2 is 8, which, added to 9, makes 17.

Before attempting the examples which follow the student ought to make himself thoroughly familiar with the cubes of the numbers from 1 to 9, so that he will not have to slow up to make such computations in the course of the example.

Find the cubes of the following numbers by both of the foregoing methods.

1. 14
2. 27
3. 33
4. 46
5. 59
6. 62
7. 65
8. 71
9. 73
10. 84
11. 86
12. 88
13. 95
14. 97
15. 99

Exercise No. 383

Algebraic Multiplication

Arithmetical products may be directly written down from right to left by using the method of cross-multiplication employed in algebra. A certain pattern is followed in multiplying each figure by every other figure. The operations are best explained by illustration.

47	345
26	678
1222	234910

In the example at the left, 7 × 6 = 42, write 2 and carry 4; 4 plus 4 × 6 (28)

plus 2 × 7 comes to 42, write 2 and carry 4; 4 plus 4 × 2 is 12, write 12. (It is best to start each part of the calculation with the carried number, which otherwise might not be easy to remember.)

In the second example, multiply 5 × 8; then 4 × 8 and 7 × 5; then 3 × 8, 6 × 5 and 4 × 7; then 3 × 7 and 6 × 4; finally 3 × 6. Carry as may be necessary.

THE ART OF CALCULATION

Table IV
Prime and Composite Numbers

1 Prime
2 Prime
3 Prime
4 = 2 × 2
5 Prime
6 = 2 × 3
7 Prime
8 = 2 × 4
9 = 3 × 3
10 = 2 × 5
11 Prime
12 = 2 × 6
3 × 4
13 Prime
14 = 2 × 7
15 = 3 × 5
16 = 2 × 8
4 = 4
17 Prime
18 = 2 × 9
3 × 6
19 Prime
20 = 2 × 10
4 × 5
21 = 3 × 7
22 = 2 × 11
23 Prime
24 = 2 × 12
3 × 8
4 × 6
25 = 5 × 5
26 = 2 × 13
27 = 3 × 9
28 = 2 × 14
4 × 7
29 Prime
30 = 2 × 15
3 × 10
5 × 6
31 Prime
32 = 2 × 16
4 × 8
33 = 3 × 11
34 = 2 × 17
35 = 5 × 7
36 = 2 × 18
3 × 12
4 × 9
6 × 6
37 Prime
38 = 2 × 19
39 = 3 × 13
40 = 2 × 20
4 × 10
5 × 8

41 Prime
42 = 2 × 21
3 × 14
6 × 7
43 Prime
44 = 2 × 22
4 × 11
45 = 3 × 15
5 × 9
46 = 2 × 23
47 Prime
48 = 2 × 24
3 × 16
4 × 12
6 × 8
49 = 7 × 7
50 = 2 × 25
5 × 10
51 = 3 × 17
52 = 2 × 26
4 × 13
53 Prime
54 = 2 × 27
3 × 18
6 × 9
55 = 5 × 11
56 = 2 × 28
4 × 14
7 × 8
57 = 3 × 19
58 = 2 × 29
59 Prime
60 = 2 × 30
3 × 20
4 × 15
5 × 12
6 × 10
61 Prime
62 = 2 × 31
63 = 3 × 21
7 × 9
64 = 2 × 32
4 × 16
8 × 8
65 = 5 × 13
66 = 2 × 33
3 × 22
6 × 11
67 Prime
68 = 2 × 34
4 × 17
69 = 3 × 23
70 = 2 × 35
5 × 14
7 × 10

71 Prime
72 = 2 × 36
3 × 24
4 × 18
6 × 12
8 × 9
73 Prime
74 = 2 × 37
75 = 3 × 25
5 × 15
76 = 2 × 38
4 × 19
77 = 7 × 11
78 = 2 × 39
3 × 26
6 × 13
79 Prime
80 = 2 × 40
4 × 20
5 × 16
8 × 10
81 = 3 × 27
9 × 9
82 = 2 × 41
83 Prime
84 = 2 × 42
3 × 28
4 × 21
6 × 14
7 × 12
85 = 5 × 17
86 = 2 × 43
87 = 3 × 29
88 = 2 × 44
4 × 22
8 × 11
89 Prime
90 = 2 × 45
3 × 30
5 × 18
6 × 15
9 × 10
91 = 7 × 13
92 = 2 × 46
4 × 23
93 = 3 × 31
94 = 2 × 47
95 = 5 × 19
96 = 2 × 48
3 × 32
4 × 24
6 × 16
8 × 12
97 Prime

98 = 2 × 49
7 × 14
99 = 3 × 33
9 × 11
100 = 2 × 50
4 × 25
5 × 20
10 × 10
101 Prime
102 = 2 × 51
3 × 34
6 × 17
103 Prime
104 = 2 × 52
4 × 26
8 × 13
105 = 3 × 35
5 × 21
7 × 15
106 = 2 × 53
107 Prime
108 = 2 × 54
3 × 36
4 × 27
6 × 18
9 × 12
109 Prime
110 = 2 × 55
5 × 22
10 × 11
111 = 3 × 37
112 = 2 × 56
4 × 28
7 × 16
8 × 14
113 Prime
114 = 2 × 57
3 × 38
6 × 19
115 = 5 × 23
116 = 2 × 58
4 × 29
117 = 3 × 39
9 × 13
118 = 2 × 59
119 = 7 × 17
120 = 2 × 60
3 × 40
4 × 30
5 × 24
6 × 20
8 × 15
10 × 12
121 = 11 × 11
122 = 2 × 61

123 = 3 × 41
124 = 2 × 62
4 × 31
125 = 5 × 25
126 = 2 × 63
3 × 42
6 × 21
7 × 18
9 × 14
127 Prime
128 = 2 × 64
4 × 32
8 × 16
129 = 3 × 43
130 = 2 × 65
5 × 26
10 × 13
131 Prime
132 = 2 × 66
3 × 44
4 × 33
6 × 22
11 × 12
133 = 7 × 19
134 = 2 × 67
135 = 3 × 45
5 × 27
9 × 15
136 = 2 × 68
4 × 34
8 × 17
137 Prime
138 = 2 × 69
3 × 46
6 × 23
139 Prime
140 = 2 × 70
4 × 35
5 × 28
7 × 20
10 × 14
141 = 3 × 47
142 = 2 × 71
143 = 11 × 13
144 = 2 × 72
3 × 48
4 × 36
6 × 24
8 × 18
9 × 16
12 × 12
145 = 5 × 29
146 = 2 × 73
147 = 3 × 49
7 × 21
148 = 2 × 74
4 × 37
149 Prime
150 = 2 × 75
3 × 50
5 × 30
6 × 25
10 × 15
151 Prime
152 = 2 × 76
4 × 38
8 × 19
153 = 3 × 51
9 × 17
154 = 2 × 77
7 × 22
11 × 14
155 = 5 × 31
156 = 2 × 78
3 × 52
4 × 39
6 × 26
12 × 13
157 Prime
158 = 2 × 79
159 = 3 × 53
160 = 2 × 80
4 × 40
5 × 32
8 × 20
10 × 16
161 = 7 × 23
162 = 2 × 81
3 × 54
6 × 27
9 × 18
163 Prime
164 = 2 × 82
4 × 41
165 = 3 × 55
5 × 33
11 × 15
166 = 2 × 83
167 Prime
168 = 2 × 84
3 × 56
4 × 42
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7 × 24
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12 × 14
169 = 13 × 13
170 = 2 × 85
5 × 34
10 × 17
171 = 3 × 57
9 × 19
172 = 2 × 86
4 × 43
173 Prime
174 = 2 × 87
3 × 58
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175 = 5 × 35
7 × 25
176 = 2 × 88
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8 × 22
11 × 16
177 = 3 × 59
178 = 2 × 89
179 Prime
180 = 2 × 90
3 × 60
4 × 45
5 × 36
6 × 30
9 × 20
10 × 18
12 × 15
181 Prime
182 = 2 × 91
7 × 26
13 × 14
183 = 3 × 61
184 = 2 × 92
4 × 46
8 × 23
185 = 5 × 37
186 = 2 × 93
3 × 62
6 × 31
187 = 11 × 17
188 = 2 × 94
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189 = 3 × 63
7 × 27
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190 = 2 × 95
5 × 38
10 × 19
191 Prime
192 = 2 × 96
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8 × 24
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193 Prime
194 = 2 × 97
195 = 3 × 65
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13 × 15
196 = 2 × 98
4 × 49
7 × 28
14 × 14
197 Prime
198 = 2 × 99
3 × 66
6 × 33
9 × 22
11 × 18
199 Prime
200 = 2 × 100
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5 × 40
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201 = 3 × 67
202 = 2 × 101
203 = 7 × 29
204 = 2 × 102
3 × 68
4 × 51
6 × 34
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205 = 5 × 41
206 = 2 × 103
207 = 3 × 69
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208 = 2 × 104
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209 = 11 × 19
210 = 2 × 105
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211 Prime
212 = 2 × 106
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213 = 3 × 71
214 = 2 × 107
215 = 5 × 43
216 = 2 × 108
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217 = 7 × 31
218 = 2 × 109
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220 = 2 × 110
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5 × 44
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221 = 13 × 17
222 = 2 × 111
3 × 74
6 × 37
223 Prime
224 = 2 × 112
4 × 56
7 × 32
8 × 28
14 × 16
225 = 3 × 75
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9 × 25
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226 = 2 × 113
227 Prime
228 = 2 × 114
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229 Prime
230 = 2 × 115
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231 = 3 × 77
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232 = 2 × 116
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233 Prime
234 = 2 × 117
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236 = 2 × 118
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237 = 3 × 79
238 = 2 × 119
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239 Prime

240 = 2 × 120
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241 Prime
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243 = 3 × 81
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244 = 2 × 122
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245 = 5 × 49
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246 = 2 × 123
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247 = 13 × 19
248 = 2 × 124
4 × 62
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249 = 3 × 83
250 = 2 × 125
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10 × 25
251 Prime
252 = 2 × 126
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253 = 11 × 23
254 = 2 × 127
255 = 3 × 85
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256 = 2 × 128
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8 × 32
16 × 16
257 Prime
258 = 2 × 129
3 × 86
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259 = 7 × 37
260 = 2 × 130
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261 = 3 × 87
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262 = 2 × 131
263 Prime
264 = 2 × 132
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266 = 2 × 133
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267 = 3 × 89
268 = 2 × 134
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269 Prime
270 = 2 × 135
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271 Prime
272 = 2 × 136
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273 = 3 × 91
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274 = 2 × 137
275 = 5 × 55
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276 = 2 × 138
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277 Prime
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280 = 2 × 140
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281 Prime
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283 Prime
284 = 2 × 142
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285 = 3 × 95
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286 = 2 × 143
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287 = 7 × 41
288 = 2 × 144
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292 = 2 × 146
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293 Prime
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297 = 3 × 99
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310 = 2 × 155
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311 = Prime
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313 Prime
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317 Prime
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347 Prime
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359 Prime
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367 Prime
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369 = 3 × 123
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370 = 2 × 185
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371 = 5 × 53
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373 Prime
374 = 2 × 187
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375 = 3 × 125
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376 = 2 × 188
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379 Prime
380 = 2 × 190
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381 = 3 × 127
382 = 2 × 191
383 Prime
384 = 2 × 192
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387 = 3 × 129
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388 = 2 × 194
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389 = Prime
390 = 2 × 195
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394 = 2 × 197
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396 = 2 × 198
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397 = Prime
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399 = 3 × 133
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400 = 2 × 200
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401 = Prime
402 = 2 × 201
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403 = 13 × 31
404 = 2 × 202
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405 = 3 × 135
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406 = 2 × 203
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407 = 11 × 37
408 = 2 × 204
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409 = Prime
410 = 2 × 205
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411 = 3 × 137
412 = 2 × 206
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413 = 7 × 59
414 = 2 × 207
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415 = 5 × 83
416 = 2 × 208
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417 = 3 × 139
418 = 2 × 109
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419 = Prime
420 = 2 × 210
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421 = Prime
422 = 2 × 211
423 = 3 × 141
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424 = 2 × 212
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425 = 5 × 85
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426 = 2 × 213
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427 = 7 × 61
428 = 2 × 214
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429 = 3 × 143
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430 = 2 × 215
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431 = Prime
432 = 2 × 216
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18 × 24
433 = Prime
434 = 2 × 217
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435 = 3 × 145
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436 = 2 × 218
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437 = 19 × 23
438 = 2 × 219
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439 = Prime
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441 = 3 × 147
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442 = 2 × 221
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443 = Prime
444 = 2 × 222
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445 = 5 × 89
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447 = 3 × 149
448 = 2 × 224
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449 = Prime
450 = 2 × 225
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451 = 11 × 41
452 = 2 × 226
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453 = 3 × 151
454 = 2 × 227
455 = 5 × 91
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456 = 2 × 228
3 × 152
4 × 114
6 × 76
8 × 57
12 × 38
19 × 24
457 = Prime
458 = 2 × 229
459 = 3 × 153
9 × 51
17 × 27
460 = 2 × 230
4 × 115
5 × 92
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20 × 23
461 = Prime
462 = 2 × 231
3 × 154
6 × 77
7 × 66
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21 × 22
463 = Prime
464 = 2 × 232
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16 × 29
465 = 3 × 155
5 × 93
15 × 31
466 = 2 × 233

467 Prime
468 = 2 × 234
3 × 156
4 × 117
6 × 78
9 × 52
12 × 39
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469 = 7 × 67
470 = 2 × 235
5 × 94
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471 = 3 × 157
472 = 2 × 236
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473 = 11 × 43
474 = 2 × 237
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475 = 5 × 95
19 × 25
476 = 2 × 238
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477 = 3 × 159
9 × 53
478 = 2 × 238
479 Prime
480 = 2 × 240
3 × 160
4 × 120
5 × 96
6 × 80
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12 × 40
15 × 32
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481 = 13 × 37
482 = 2 × 241
483 = 3 × 161
7 × 69
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484 = 2 × 242
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485 = 5 × 97
486 = 2 × 243
3 × 162
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487 Prime
488 = 2 × 244
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489 = 3 × 163
490 = 2 × 245
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491 Prime
492 = 2 × 246
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493 = 17 × 29
494 = 2 × 247
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495 = 3 × 165
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496 = 2 × 298
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497 = 7 × 71
498 = 2 × 299
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499 Prime
500 = 2 × 250
4 × 125
5 × 100
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20 × 25
501 = 3 × 167
502 = 2 × 251
503 Prime
504 = 2 × 252
3 × 168
4 × 126
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505 = 5 × 101
506 = 2 × 253
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507 = 3 × 169
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508 = 2 × 254
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509 Prime
510 = 2 × 255
3 × 170
5 × 102
6 × 85
10 × 51
15 × 34
17 × 30
511 = 7 × 73
512 = 2 × 256
4 × 128
8 × 64
16 × 32
513 = 3 × 171
9 × 57
19 × 27
514 = 2 × 257
515 = 5 × 103
516 = 2 × 258
3 × 172
4 × 129
6 × 86
12 × 43
517 = 11 × 47
518 = 2 × 259
7 × 74
14 × 37
519 = 3 × 173
520 = 2 × 260
4 × 130
5 × 104
8 × 65
10 × 52
13 × 40
20 × 26
521 Prime
522 = 2 × 261
3 × 174
6 × 87
9 × 58
18 × 29
523 Prime
524 = 2 × 262
4 × 131
525 = 3 × 175
5 × 105
7 × 75
15 × 35
21 × 25
526 = 2 × 263
527 = 17 × 31
528 = 2 × 264
3 × 176
4 × 132
6 × 88
8 × 66
11 × 48
12 × 44
16 × 33
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529 = 23 × 23
530 = 2 × 265
5 × 106
10 × 53
531 = 3 × 177
9 × 59
532 = 2 × 266
4 × 133
7 × 76
14 × 38
19 × 28
533 = 13 × 41
534 = 2 × 267
3 × 178
6 × 89
535 = 5 × 107
536 = 2 × 268
4 × 134
8 × 67
537 = 3 × 179
538 = 2 × 269
539 = 7 × 77
11 × 49

540 = 2 × 270
3 × 180
4 × 135
5 × 108
6 × 90
9 × 60
10 × 54
12 × 45
15 × 36
18 × 30
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541 Prime

542 = 2 × 271

543 = 3 × 181

544 = 2 × 272
4 × 136
8 × 68
16 × 34
17 × 32

545 = 5 × 109

546 = 2 × 273
3 × 182
6 × 91
7 × 78
13 × 42
14 × 39
21 × 26

547 Prime

548 = 2 × 274
4 × 137

549 = 3 × 183
9 × 61

550 = 2 × 275
5 × 110
10 × 55
11 × 50
22 × 25

551 = 19 × 29

552 = 2 × 276
3 × 184
4 × 138
6 × 92
8 × 69
12 × 46
23 × 24

553 = 7 × 79

554 = 2 × 277

555 = 3 × 185
5 × 111
15 × 37

556 = 2 × 278
4 × 139

557 Prime

558 = 2 × 279
3 × 186
6 × 93
9 × 62
18 × 31

559 = 13 × 43

560 = 2 × 280
4 × 140
5 × 112
7 × 80
8 × 70
10 × 56
14 × 40
16 × 35
20 × 28

561 = 3 × 187
11 × 51
17 × 33

562 = 2 × 281

563 Prime

564 = 2 × 282
3 × 188
4 × 141
6 × 94
12 × 47

565 = 5 × 113

566 = 2 × 283

567 = 3 × 189
7 × 81
9 × 63
21 × 27

568 = 2 × 284
4 × 142
8 × 71

569 Prime

570 = 2 × 285
3 × 190
5 × 114
6 × 95
10 × 57
15 × 38
19 × 30

571 Prime

572 = 2 × 286
4 × 143
11 × 52
13 × 44
22 × 26

573 = 3 × 191

574 = 2 × 287
7 × 82
14 × 41

575 = 5 × 115
23 × 25

576 = 2 × 288
3 × 192
4 × 144
6 × 96
8 × 72
9 × 64
12 × 48
16 × 36
18 × 32
24 × 24

577 Prime

578 = 2 × 289
17 × 34

579 = 3 × 193

580 = 2 × 290
4 × 145
5 × 116
10 × 58
20 × 29

581 = 7 × 83

582 = 2 × 291
3 × 194
6 × 97

583 = 11 × 53

584 = 2 × 292
4 × 146
8 × 73

585 = 3 × 195
5 × 117
9 × 65
13 × 45
15 × 39

586 = 2 × 293

587 Prime

588 = 2 × 294
3 × 196
4 × 147
6 × 98
7 × 84
12 × 49
14 × 42
21 × 28

589 = 19 × 31

590 = 2 × 295
5 × 118
10 × 59

591 = 3 × 197

592 = 2 × 296
4 × 148
8 × 74
16 × 37

593 Prime

594 = 2 × 297
3 × 198
6 × 99
9 × 66
11 × 54
18 × 33
22 × 27

595 = 5 × 119
7 × 85
17 × 35

596 = 2 × 298
4 × 149

597 = 3 × 199

598 = 2 × 299
13 × 46
23 × 26

599 Prime

600 = 2 × 300
3 × 200
4 × 150
5 × 120
6 × 100
8 × 75
10 × 60
12 × 50
15 × 40
20 × 30
24 × 25

601 Prime

602 = 2 × 301
7 × 86
14 × 43

603 = 3 × 201
9 × 67

604 = 2 × 302
4 × 151

605 = 5 × 121
11 × 55

606 = 2 × 303
3 × 202
6 × 101

607 Prime

608 = 2 × 304
1 × 152
8 × 76
16 × 38
19 × 32

609 = 3 × 203
7 × 87
21 × 29

610 = 2 × 305
5 × 122
10 × 61

611 = 13 × 47

612 =	2 × 306	616 =	2 × 308	619	Prime	624 =	2 × 312
	3 × 204		4 × 154	620 =	2 × 310		3 × 208
	4 × 152		7 × 88		4 × 155		4× 156
	6 × 102		8 × 77		5 × 124		6 × 104
	9 × 68		11 × 56		10 × 62		8 × 78
	12 × 51		14 × 44		20 × 31		12 × 52
	17 × 36		22 × 28	621 =	3 × 207		13 × 48
	18 × 34	617	Prime		9 × 69		16 × 39
613	Prime	618 =	2 × 309		23 × 27		24 × 26
614 =	2 × 307		3 × 206	622 =	2 × 311	*625* =	5 × 125
615 =	3 × 205		6 × 103	623 =	7 × 89		25 × 25
	5 × 123						
	15 × 41						

ANSWERS

The references at the head of each section are to the numbers of the exercises.

No. 1

1. 32
2. 30
3. 29
4. 29
5. 29
6. 31
7. 31
8. 18
9. 37
10. 31
11. 25
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No. 2

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No. 3

1. 59
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18. 53

No. 4

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No. 6

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No. 7

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No. 8

(Same as No.l)

No. 9

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No. 10

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No. 11

(Same as No. 3)

No. 12

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No. 13

1. 365
2. 268
3. 371

4. 433
5. 257
6. 327
7. 209
8. 270
9. 287
10. 410
11. 257
12. 404
13. 231
14. 217
15. 311
16. 303
17. 254
18. 237
19. 308
20. 343
21. 350
22. 360
23. 308
24. 271
25. 341

No. 14

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No. 15

1. 620
2. 777
3. 716
4. 562
5. 432
6. 590
7. 624
8. 716
9. 885
10. 828
11. 424
12. 592
13. 535
14. 656
15. 858

No. 16

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No. 17

1. 1059
2. 1055
3. 903
4. 963
5. 897
6. 1113
7. 1067
8. 759
9. 994
10. 932

No. 18

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No. 19

1. 12

2. 34
3. 21
4. 56
5. 33
6. 78
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10. 21
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12. 34
13. 52
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15. 52

No. 20

1. 28
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9. 48
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11. 39
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No. 21

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No. 22

1. 294
2. 234
3. 414
4. 358
5. 379
6. 381
7. 370
8. 347
9. 221
10. 374

No. 23

1. 521
2. 213
3. 233
4. 321
5. 331
6. 313
7. 252
8. 412
9. 212
10. 130

11. 122
12. 441
13. 432
14. 351
15. 221

No. 24

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No. 26

1. $655.71
2. $751.32
3. $604.24
4. $577.21
5. $718.69
6. $769.64
7. $488.04
8. $691.93

No. 27

1. 215
2. 415
3. 209
4. 329
5. 778
6. 109
7. 214
8. 248
9. 128
10. 237
11. 403
12. 106
13. 125
14. 125
15. 136
16. 204
17. 109
18. 143
19. 107

20. 308
21. 309
22. 437
23. 722
24. 109
25. 515
26. 209
27. 336
28. 107
29. 868
30. 419

No. 28

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No. 31

1. 621
2. 585
3. 687
4. 647
5. 630
6. 605
7. 570
8. 671
9. 625
10. 624

No. 32

1. 161
2. 292
3. 71
4. 191
5. 171
6. 64
7. 252
8. 197
9. 623
10. 284
11. 94
12. 387
13. 170
14. 61
15. 593
16. 195
17. 394
18. 295
19. 492
20. 681

No. 33

1. 465
2. 579
3. 164
4. 186
5. 153
6. 48
7. 489

8. 186
9. 488
10. 377
11. 329
12. 469
13. 288
14. 56
15. 216
16. 184
17. 249
18. 77
19. 289
20. 169

No. 34

1. $995.69
2. $1044.85
3. $954.07
4. $1002.63
5. $994.32
6. $897.80
7. $1122.66
8. $1051.42

No. 35

1. 395
2. 297
3. 92
4. 299
5. 298
6. 195
7. 298
8. 399
9. 494
10. 497
11. 296
12. 94
13. 495
14. 294
15. 299
16. 198

17. 197
18. 397
19. 293
20. 692
21. 198
22. 294
23. 596
24. 99
25. 395

No. 36

1. 985
2. 987
3. 975
4. 1008
5. 953
6. 1011
7. 1042
8. 1032
9. 1095
10. 1012

No. 37

1. 347
2. 189
3. 349
4. 78
5. 107
6. 259
7. 189
8. 119
9. 66
10. 88
11. 215
12. 178
13. 178
14. 9
15. 227
16. 109
17. 114
18. 249

19. 234
20. 29
21. 298
22. 284
23. 38
24. 376
25. 129

No. 38

1. $42357.49
2. $57112.34
3. $54738.19
4. $62369.15
5. $70468.35
6. $63801.69

No. 39

1. $4.35
2. $5.59
3. $ .94
4. $1.48
5. $6.92
6. $7.63
7. $2.31
8. $6.84
9. $3.70
10. $2.76
11. $2.29
12. $6.76
13. $3.59
14. $5.96
15. $1.56
16. $3.89
17. $2.68
18. $6.92
19. $3.49
20. $5.97

No. 40

(Same as No. 13)

No. 41

1. $95513.02

2. $102635.78
3. $98506.46
4. $117398.69
5. $95153.78
6. $99073.91

No. 42

(Same as No. 39)

No. 43

1. $ .93
2. $1.20
3. $2.81
4. $ .65
5. $1.96
6. $5.84
7. $2.95
8. $1.65
9. $2.24
10. $ .71
11. $1.89
12. $ .73
13. $1.23
14. $1.63
15. $1.71
16. $2.48
17. $1.86
18. $1.94
19. $2.45
20. $1.63

No. 44

(Same as No. 43)

No. 45

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114
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112
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No. 46

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No. 47

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No. 48

1. $3433540.07
2. $2509179.07
3. $3688667.60
4. $3251326.81
5. $3449296.55
6. $3353169.99

No. 49

1. $18.53
2. $25.66
3. $23.95
4. $14.78
5. $41.76
6. $38.38
7. $15.74
8. $42.95
9. $60.76
10. $71.19
11. $66.57
12. $59.85
13. $93.72

14. $80.90
15. $75.68
16. $61.52

No. 50

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365

No. 51

(Same as No. 49)

No. 52

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342
78
414
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486
222
558
336
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408

144
480
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384
120
456
192
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264
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378
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No. 53

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91
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189
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252
644
336
28

420
112
504
245
637
329
21
413
301
693
385
77
469
161
553
294
686
378
70
462
350
42
434
126
518
210
602
343
35
427
119
51.1

No. 54

1. $6537136.94
2. $6295852.28
3. $6328194.91
4. $5945296.77

No. 55

1. $19.76

2. $18.86
3. $44.51
4. $26.39
5. $41.42
6. $6.20
7. $12.22
8. $19.63
9. $87.27
10. $84.51
11. $71.61
12. $55.60
13. $97.15
14. $73.69
15. $61.63
16. $68.20

No. 56

8
456
104
552
200
648
296
744
448
96
544
192
640
64
512
160
608
256
704
352
56
504
152

600
248
696
120
568
216
664
312
760
408
112
560
208
656
304
752
176
624
272
720
368
16
464
168
616
264
712
360
232
680
328
776
424
72
520
224
672
320
768

416
288
736
384
32
480
128
576
280
728
376
24
472
344
792
440
88
536
184
632
336
784
432
80
528
400
48
496
144
592
240
688
392
40
488
136
584

No. 57

(Same as No. I5)

No. 58

(Same as No. 55)

No. 59

1. 795
2. 682
3. 564
4. 814
5. 598
6. 924
7. 810
8. 946
9. 1032
10. 912
11. 901
12. 621
13. 665
14. 308
15. 962
16. 714
17. 1008
18. 364
19. 736
20. 782
21. 855
22. 864
23. 865
24. 988
25. 667

No. 60

9
513
117
621
225
729
333
837
504
108

612
216
720
72
572
180
684
288
792
396
63
567
171
675
279
783
135
639
243
747
351
855
459
126
630
234
738
342
846
198
702
306
810
414
18
522
189
693
297

801
405
261
765
369
873
477
81
585
252
756
360
864
468
324
828
432
36
540
144
648
315
819
423
27
531
387
891
495
99
603
207
711
378
882
486
90
594
450

54
558
162
666
270
774
441
45
549
153
657

No. 61

11
627
143
759
275
891
407
1023
616
132
748
264
880
88
704
220
836
352
968
484
77
693
209
825
341
957
165

781
297
913
429
1045
561
154
770
286
902
418
1034
242
858
374
990
506
22
608
231
847
363
979
495
319
935
451
1067
583
99
715
308
924
440
1056
572
396
1012
528

44
660
176
792
385
1001
517
33
649
473
1089
605
121
737
253
869
462
1078
594
110
726
550
66
682
198
814
330
946
539
55
671
187
803

No. 62

1. $11230083.55
2. $10797546.08
3. $8876665.99
4. $8230948.08

No. 63

1. $47.65
2. $6.21
3. $79.61
4. $34.74
5. $14.68
6. $27.74
7. $27.93
8. $21.85
9. $54.46
10. $13.83
11. $36.49
12. $4.46
13. $50.47
14. $8.53
15. $27.16
16. $39.87

No. 65

(Same as No. 63)

No. 66

1. 1827
2. 1705
3. 1170
4. 1376
5. 2511
6. 2624
7. 3772
8. 1200
9. 1537
10. 1235
11. 1408
12. 1428
13. 1407
14. 1408
15. 2016
16. 2418
17. 3772
18. 1164
19. 2015
20. 2592

No. 67

1. $846.98
2. $836.87
3. $666.99
4. $829.97
5. $634.22
6. $827.43
7. $857.76
8. $527.72
9. $418.44
10. $906.92
11. $447.71
12. $586.87
13. $407.46
14. $510.63
15. $533.62
16. $663.85

No. 68

(Same as No. 17)

No. 69

(Same as No. 67)

No. 71

1. $276.69
2. $855.51
3. $682.90
4. $520.36
5. $773.79
6. $891.54
7. $326.93
8. $245.59
9. $371.93
10. $471.54
11. $386.88
12. $330.44
13. $878.62
14. $696.89
15. $770.20
16. $674.87

No. 72

(Same as No. 22)

No. 73

1. 755717535
2. 756410013
3. 824293224
4. 824985702
5. 3674994324
6. 1167178458
7. 1236433047
8. 6091457406
9. 1690209807
10. 1752668607
11. 1511041308
12. 3675686802
13. 1306128921
14. 1031412036
15. 1442533509

No. 74

1. 1536
2. 4606
3. 2646
4. 1495
5. 5313
6. 3230
7. 7347
8. 4814
9. 4284
10. 1295
11. 6624
12. 1624
13. 1886
14. 3618
15. 5494
16. 3861
17. 3344
18. 8608
19. 1612
20. 2655

No. 75

(Same as No. 71)

No. 76

(Same as No. 26)

No. 77

12
684
156
828
300
972
444
1116
672
144
816
288
960
96
768
240
912
384
1056
528
84
756
228
900
372
1044
180
852
324
996
468
1140
612
168
840

312
984
456
1128
264
936
408
1080
552
24
696
252
924
396
1068
540
348
1020
492
1164
636
108
780
336
1008
480
1152
624
432
1104
576
48
720
192
864
420
1092
564
36

708
516
1188
660
132
804
276
948
504
1176
648
120
792
600
72
744
216
888
360
1032
588
60
732
204
876

No. 78

(Same as No. 34)

No. 79

1. $451.84
2. $189.86
3. $343.97
4. $352.59
5. $188.21
6. $145.71
7. $291.97
8. $664.63
9. $136.68
10. $86.14
11. $440.45

12. $221.48
13. $196.63
14. $146.23
15. $586.21
16. $568.49

No. 80

1. 17081
2. 13361
3. 25543
4. 22632
5. 37893
6. 34323
7. 52643
8. 45201
9. 68302
10. 62693
11. 19602
12. 12312
13. 77922
14. 33033
15. 25662
16. 12831
17. 16086
18. 20274
19. 22263
20. 47583
21. 44896

No. 81

1. 123782280
2. 123895704
3. 135014592
4. 135128016
5. 601943392
6. 191177264
7. 202520776
8. 997746448
9. 276846856
10. 287077256
11. 247500064

12. 602056816
13. 213936568
14. 168939488
15. 236278872

No. 82

(Same as No. 38)

No. 83

1. $451.84
2. $189.86
3. $343.97
4. $352.59
5. $188.21
6. $145.71
7. $291.97
8. $664.63
9. $136.68
10. $86.14
11. $440.45
12. $221.48
13. $196.63
14. $146.23
15. $586.21
16. $568.49

No. 84

1. 19584
2. 23793
3. 28288
4. 24466
5. 17344
6. 21483
7. 24208
8. 21346
9. 25164
10. 12691
11. 17138
12. 21918
13. 30702
14. 36206
15. 33355

16. 17199
17. 27846
18. 31003
19. 29120
20. 33948
21. 16238

No. 86

1. $95513.02
2. $102635.78
3. $98506.46
4. $117398.69
5. $95153.78
6. $99073.91

No. 89

1. 170810
2. 133610
3. 255430
4. 226320
5. 378930
6. 343230
7. 526430
8. 452010
9. 683020
10. 626930
11. 196020
12. 123120
13. 779220
14. 330330
15. 256620
16. 128310
17. 160860
18. 202740
19. 222630
20. 465830
21. 448960

No. 90

13
741
169

897
325
1053
481
1209
728
156
884
312
1040
104
832
260
988
418
1144
572
91
819
247
975
403
1131
195
923
351
1079
507
1235
663
182
910
338
1066
494
1222
286
1014
442

1170
598
26
754
273
1001
429
1157
585
377
1105
533
1261
689
117
845
364
1092
520
1248
676
468
1196
624
52
780
208
936
455
1183
611
39
767
559
1287
715
143
871
299

1027
546
1274
702
130
858
650
78
806
234
962
390
1118
637
65
793
221
949

No. 91

(Same as No. 48)

No. 93

1. 195840
2. 237930
3. 282880
4. 244660
5. 173440
6. 214830
7. 242080
8. 213460
9. 251640
10. 126910
11. 171380
12. 219180
13. 307020
14. 362060
15. 333550
16. 171990
17. 278460
18. 310030

19. 291200
20. 339480
21. 162380

No. 94

1. 13502509
2. 13514882
3. 14727760
4. 14740133
5. 65661630
6. 20854138
7. 2209151S
8. 10883691
9. 30199211
10. 30315171
11. 26997983
12. 65674003
13. 23336785
14. 18438381
15. 25773945

No. 96

(Same as No. 54

No. 97

1. 11211
2. 24642
3. 40051
4. 57902
5. 77691
6. 92412
7. 29432
8. 21311
9. 35742
10. 52151
11. 71002
12. 91791
13. 25521
14. 48155
15. 24442
16. 49184
17. 76146

18. 44844
19. 37296
20. 97902
21. 39693

No. 99

1. $11230083.55
2. $10797546.08
3. $8876665.99
4. $8230948.08

No. 101

1. 36156
2. 59290
3. 80618
4. 22869
5. 36696
6. 52624
7. 71918
8. 93555
9. 97856
10. 103972
11. 108988
12. 84058
13. 103474
14. 108580
15. 79165
16. 57318
17. 65778
18. 77744
19. 91086
20. 35547
21. 80690

No. 103

1. 365
2. 268
3. 371
4. 433
5. 257
6. 327
7. 209

8. 270
9. 287
10. 410
11. 257
12. 404
13. 231
14. 217
15. 311
16. 303
17. 254
18. 237
19. 308
20. 343
21. 350
22. 360
23. 308
24. 271
25. 341

No. 105

1. 116081
2. 142272
3. 165481
4. 107512
5. 132181
6. 159372
7. 156996
8. 191522
9. 181692
10. 217894
11. 110564
12. 110940
13. 121598
14. 120273
15. 134316
16. 120990
17. 113970
18. 145262
19. 122811
20. 139635

21. 144284

No. 106

14
798
182
966
350
1134
518
1302
784
168
952
336
1120
112
896
280
1064
448
1232
616
98
882
266
1050
434
1218
210
994
378
1162
546
1330
714
196
980
364
1148

532
1316
308
1092
476
1260
644
28
812
294
1078
462
1246
630
406
1190
574
1358
742
126
910
392
1176
560
1344
728
504
1288
672
56
840
224
1008
490
1274
658
42
826
602

1386
770
154
938
322
1106
588
1372
756
140
924
700
84
868
252
1036
420
1204
686
70
854
238
1022

No. 107

(Same as No. 17)

No. 109

1. 136004
2. 229024
3. 268746
4. 128064
5. 160446
6. 236496
7. 195853
8. 223096
9. 368063
10. 145673
11. 187146
12. 305283
13. 355096

14. 291014
15. 348928
16. 145728
17. 336414
18. 395324
19. 430265
20. 247275
21. 575276

No. 110

1. 146267910
2. 146401938
3. 159540624
4. 159674652
5. 711289224
6. 225905508
7. 239309622
8. 1178991756
9. 327137382
10. 339226182
11. 292459608
12. 711423252
13. 252799146
14. 199628136
15. 279200034

No. 111

(Same as No. 26)

No. 113

1. 164232
2. 227238
3. 301464
4. 377910
5. 456576
6. 497502
7. 658752
8. 172104
9. 243320
10. 279396
11. 354252
12. 427652

13. 484432
14. 588078
15. 671944
16. 175392
17. 173514
18. 257237
19. 341968
20. 429525
21. 519302

No. 116

(Same as No, 34)

No. 118

(Same as No. 38)

No. 119

15
855
195
1035
375
1215
555
1395
840
180
1020
360
1200
120
960
300
1140
480
1320
660
105
945
285
1125
465

1305
225
1065
405
1245
585
1425
765
210
1050
390
1230
570
1410
330
1170
510
1350
690
30
870
315
1155
495
1335
675
435
1275
615
1455
795
135
975
420
1260
600
1440
780
540

1380
720
60
900
240
1080
525
1365
705
45
885
645
1485
825
165
1005
345
1185
630
1470
810
150
990
750
90
930
270
1110
450
1290
735
75
915
255
1095

No. 120

(Same as No. 41)

No. 122

(Same as No. 48)

No. 123

1. 157510725
2. 157655055
3. 171803640
4. 171947970
5. 765962140
6. 243269630
7. 257704045
8. 1269714410
9. 352282645
10. 365300645
11. 314939380
12. 766106470
13. 272230435
14. 214972460
15. 300660615

No. 124

(Same as No. 54)

No. 126

(Same as No. 62)

No. 128

(Same as No. 38)

No. 131

16
912
208
1104
400
1296
92
1488
896
192
1088
384
1280
128
1024
320

1216
512
1408
704
112
1008
304
1200
496
1392
240
1136
432
1328
624
1520
816
224
1120
416
1312
608
1504
352
1248
544
1440
736
32
928
336
1232
528
1424
720
464
1360
656
1552

848
144
1040
448
1344
640
1536
832
576
1472
768
64
960
256
1152
560
1456
752
48
944
688
1584
880
176
1072
368
1264
672
1568
864
160
1056
800
96
992
288
1184
480
1376

784
80
976
272
1168

No. 132

1. 168753540
2. 168908172
3. 184066656
4. 184221288
5. 820635056
6. 260633752
7. 276098468
8. 1360237064
9. 377427908
10. 391375108
11. 337419152
12. 820789688
13. 291661724
14. 230316784
15. 322121196

No. 140

17
969
221
1173
425
1377
629
1581
952
204
1156
408
1360
136
1088
340
1292

544
1496
748
119
1071
323
1275
527
1479
255
1207
459
1411
663
1615
867
238
1190
442
1394
646
1598
374
1326
578
1530
782
34
996
357
1309
561
1513
765
493
1445
697
1649
901

153
1105
476
1428
680
1632
884
912
1564
816
68
1020
272
1224
595
1547
799
51
1003
731
1683
935
187
1139
391
1343
714
1666
918
170
1122
850
102
1054
306
1258
510
1462
833

85
1037
289
1241

No. 141

1. 179996355
2. 180161289
3. 196329672
4. 196494606
5. 875307972
6. 277997874
7. 294492891
8. 1450859718
9. 402573171
10. 417449571
11. 359898924
12. 875472906
13. 311093013
14. 245661108
15. 343581777

No. 148

18
1026
234
1242
450
1458
666
1674
1008
216
1224
432
1440
144
1152
360
1368
576

1584
792
126
1134
342
1350
558
1566
270
1278
486
1494
702
1710
918
252
1260
468
1476
684
1692
396
1404
612
1620
828
36
1044
378
1386
594
1602
810
522
1530
738
1746
954
162

1170
504
1512
720
1728
936
648
1656
864
72
1080
288
1296
630
1638
846
54
1062
774
1782
990
198
1206
414
1422
756
1764
972
180
1188
900
108
1116
324
1332
540
1548
882
90

1098
306
1314

No. 149

1. 191239170
2. 191414406
3. 208592688
4. 208767924
5. 929980808
6. 295361996
7. 312887314
8. 1541482372
9. 427718434
10. 443524034
11. 382378696
12. 930156124
13. 330524302
14. 261005432
15. 365042358

No. 156

19
1083
247
1311
475
1539
703
1767
1064
228
1292
456
1520
152
1216
380
1444
608
1672

836
133
1197
361
1425
589
1653
285
1349
513
1577
741
1805
969
266
1330
494
1558
722
1786
418
1482
646
1710
874
38
1102
399
1463
627
1691
855
551
1615
779
1843
1007
171
1235

532
1596
760
1824
988
684
1748
912
76
1140
304
1368
665
1729
893
57
1121
817
1881
1045
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437
1501
798
1862
1026
190
1254
950
114
1178
342
1406
570
1634
931
95
1159

323
1387

No. 159

1. 202481985
2. 202667523
3. 220855704
4. 221041242
5. 984653804
6. 312726118
7. 331281737
8. 1632105026
9. 452863697
10. 469598497
11. 404858468
12. 984839342
13. 349955591
14. 276349756
15. 386502939

No. 165

20
1140
260
1380
500
1620
740
1860
1120
240
1360
480
1600
160
1280
400
1520
640
1760
880

140
1260
380
1500
620
1740
300
1420
540
1660
780
1900
1020
280
1400
520
1640
760
1880
440
1560
680
1800
920
40
1160
420
1540
660
1780
900
580
1700
820
1940
1060
180
1300
560

1680
800
1920
1040
720
1840
960
80
1200
320
1440
700
1820
940
60
1180
860
1980
1100
220
1340
460
1580
840
1960
1080
200
1320
1000
120
1240
360
1480
600
1720
980
100
1220
340

1460

No. 166

1. 213724800
2. 213920640
3. 233118720
4. 233314560
5. 1039326720
6. 330090240
7. 349676160
8. 1722727680
9. 478008960
10. 495672960
11. 427338240
12. 1039522560
13. 369386880
14. 291694080
15. 407963520

No. 172

21
1197
273
1449
525
1701
777
1953
1176
252
1428
504
1680
168
1344
420
1596
672
1848
924
147

1323
399
1575
651
1827
315
1491
567
1743
819
1995
1071
294
1470
546
1722
798
1974
462
1638
714
1890
966
42
1218
441
1617
693
1869
945
609
1785
861
2037
1113
189
1365
588
1744

840
2016
1092
756
1932
1008
84
1260
336
1512
735
1911
987
63
1239
903
2079
1155
231
1407
483
1659
882
2058
1134
210
1386
1050
126
1302
378
1554
630
1806
1029
105
1281
357
1533

No. 173

1. 224967615
2. 225173757
3. 245381736
4. 245587878
5. 1093999636
6. 347454362
7. 368070583
8. 1813350334
9. 503154223
10. 521747423
11. 449818012
12. 1094205778
13. 388818169
14. 307038404
15. 429424101

No. 179

22
1254
286
1518
550
1782
814
2046
1232
264
1496
528
1760
176
1408
440
1672
704
1936
968
154
1386

418
1650
682
1914
330
1562
604
1826
858
2090
1122
308
1540
572
1804
836
2068
484
1716
748
1980
1012
44
1276
462
1694
726
1958
990
638
1870
902
2134
1166
198
1430
616
1848
880

2112
1144
792
2024
1056
88
1320
352
1584
770
2002
1034
66
1298
946
2178
1210
242
1474
506
1738
924
2156
1188
220
1452
1100
132
1364
396
1628
660
1892
1078
110
1342
374
1606

No. 180

1. 236210430
2. 236426874
3. 257644752
4. 257861196
5. 1148672552
6. 364818484
7. 386465006
8. 1903972988
9. 528299486
10. 547821886
11. 472297784
12. 1148888996
13. 408249458
14. 322382728
15. 450884682

No. 186

23
1311
299
1587
575
1863
851
2139
1288
276
1564
552
1840
184
1472
460
1748
736
2024
1012
161
1449
437

1725
713
2001
345
1623
621
1909
897
2185
1173
322
1610
598
1886
874
2162
506
1794
782
2070
1058
46
1334
483
1771
759
2047
1035
667
1955
943
2231
1219
207
1495
644
1932
920
2208

1196
828
2116
1104
92
1380
368
1656
805
2093
1081
69
1357
989
2277
1265
253
1541
529
1817
966
2254
1242
230
1518
1150
138
1426
414
1702
690
1978
1127
115
1403
391
1679

No. 187

1. 247453245

2. 247679991
3. 269907768
4. 270134514
5. 1203345468
6. 382182606
7. 404859429
8. 1994595642
9. 553444749
10. 573896349
11. 494777556
12. 1203572214
13. 427680747
14. 337727052
15. 472345263

No. 193

24
1368
312
1656
600
1944
888
2232
1344
288
1632
576
1920
192
1536
480
1824
768
2112
1056
168
1512
456
1800

744
2088
360
1704
648
1992
936
2280
1224
336
1680
624
1968
912
2256
528
1872
816
2160
1104
48
1392
504
1848
792
2136
1080
696
2040
984
2328
1272
216
1560
672
2016
960
2304
1248

864
2208
1152
96
1440
384
1728
840
2184
1128
72
1416
1032
2376
1320
264
1608
552
1896
1008
2352
1296
240
1584
1200
144
1488
432
1776
720
2064
1176
120
1464
408
1752

No. 194

1. 258696060
2. 258933108

3. 282170784
4. 282407832
5. 1258018384
6. 399546728
7. 423253852
8. 2085218296
9. 578590012
10. 599970812
11. 517257328
12. 1258255432
13. 447112036
14. 353071376
15. 493805844

No. 200

25
1425
325
1725
625
2025
925
2325
1400
300
1700
600
2000
200
1600
500
1900
800
2200
1100
175
1575
475
1875
775

2175
375
1775
675
2075
975
2375
1275
350
1750
650
2050
950
2350
550
1950
850
2250
1150
50
1450
525
1925
825
2225
1125
725
2125
1025
2425
1325
225
1625
700
2100
1000
2400
1300
900

2300
1200
100
1500
400
1800
875
2275
1175
75
1475
1075
2475
1375
275
1675
575
1975
1050
2450
1350
250
1650
1250
150
1550
450
1850
750
2150
1225
125
1525
425
1825

No. 201

1. 269938875
2. 270186225
3. 294433800

4. 294681150
5. 1312691300
6. 416910850
7. 441648275
8. 2175840950
9. 603735275
10. 626045275
11. 539737100
12. 1312938650
13. 466543325
14. 368415700
15. 515266425

No. 204

(Annex 0 to Answers to No. 45)

No. 208

(Annex 0 to Answers to No. 46)

No. 212

(Annex 0 to Answers to No. 47)

No. 215

(Annex 0 to Answers to No. 60)

No. 219

(Annex 0 to Answers to No. 52)

No. 222

(Annex 0 to Answers to No. 68)

No. 226

(Annex 0 to Answers to No. 56)

No. 228

(Annex 0 to Answers to No. 60)

No. 229

1. 242
2. 464
3. 686
4. 902
5. 1124
6. 1246
7. 1462
8. 1684
9. 1906
10. 322

11. 444
12. 666
13. 882
14. 1104
15. 1326
16. 1442
17. 1664
18. 1886
19. 302
20. 524

No. 232

(Annex 0 to Answers to No. 61)

No. 233

1. 393
2. 726
3. 1059
4. 1392
5. 1713
6. 1896
7. 2229
8. 2562
9. 2883
10. 516
11. 699
12. 1032
13. 1353
14. 1686
15. 2019
16. 2202
17. 2523
18. 2856
19. 489
20. 822

No. 236

(Annex 0 to Answers to No. 77)

No. 237

1. 564
2. 1008
3. 1452

4. 1896
5. 2340
6. 2564
7. 3008
8. 3452
9. 3892
10. 740
11. 964
12. 1408
13. 1852
14. 2296
15. 2740
16. 2964
17. 3408
18. 3852
19. 696
20. 1140

No. 239

(Annex 0 to Answers to No. 90)

No. 240

1. 755
2. 1310
3. 1865
4. 2420
5. 2975
6. 3280
7. 3805
8. 4360
9. 4915
10. 970
11. 1275
12. 1830
13. 2355
14. 2910
15. 3465
16. 3770
17. 4325
18. 4880
19. 905

20. 1460

No. 242

(Annex 0 to Answers to No. 106)

No. 243

1. 846
2. 1512
3. 2178
4. 2844
5. 3510
6. 4176
7. 4482
8. 5106
9. 5772
10. 1038
11. 1704
12. 2370
13. 2676
14. 3342
15. 3966
16. 4632
17. 5298
18. 5964
19. 870
20. 1536

No. 244

(Annex 0 to Answers to No. 119)

No. 245

1. 917
2. 1694
3. 2471
4. 3248
5. 4025
6. 4802
7. 5579
8. 5866
9. 6587
10. 1064
11. 1841
12. 2618

13. 3395
14. 4172
15. 4459
16. 5236
17. 5957
18. 6734
19. 1211
20. 1988

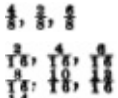
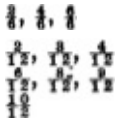
No. 246

(Annex 0 to Answers to No. 181)

No. 247

1. 1128
2. 2016
3. 2904
4. 3792
5. 4680
6. 5568
7. 5976
8. 6864
9. 7752
10. 1368
11. 2256
12. 3144
13. 355?
14. 4440
15. 5328
16. 6216
17. 7104
18. 7992
19. 5928
20. 5216

No. 248

1. 
2.
3. 
4.

5. $\frac{3}{24}, \frac{8}{24}, \frac{4}{24}, \frac{6}{24}, \frac{5}{24}, \frac{10}{24}, \frac{12}{24}, \frac{14}{24}, \frac{15}{24}, \frac{16}{24}, \frac{18}{24}, \frac{20}{24}, \frac{22}{24}$
6. $\frac{2}{10}, \frac{4}{10}, \frac{5}{10}, \frac{6}{10}, \frac{8}{10}$
7. $\frac{3}{20}, \frac{4}{20}, \frac{6}{20}, \frac{8}{20}, \frac{10}{20}, \frac{12}{20}, \frac{14}{20}, \frac{16}{20}, \frac{18}{20}$
8. $\frac{4}{40}, \frac{5}{40}, \frac{8}{40}, \frac{10}{40}, \frac{12}{40}, \frac{16}{40}, \frac{16}{40}, \frac{20}{40}, \frac{24}{40}, \frac{25}{40}, \frac{28}{40}, \frac{30}{40}, \frac{32}{40}, \frac{35}{40}, \frac{36}{40}$
9. $\frac{3}{15}, \frac{5}{15}, \frac{6}{15}, \frac{9}{15}, \frac{10}{15}, \frac{12}{15}$
10. $\frac{3}{30}, \frac{5}{30}, \frac{6}{30}, \frac{9}{30}, \frac{10}{30}, \frac{12}{30}, \frac{15}{30}, \frac{18}{30}, \frac{20}{30}, \frac{21}{30}, \frac{24}{30}, \frac{25}{30}, \frac{27}{30}$

No. 249

(Annex 0 to Answers to No. 140)

No. 250

1. $\frac{3}{4}$
2. $1\frac{1}{4}$
3. $\frac{5}{8}$
4. $\frac{7}{8}$
5. $1\frac{1}{2}$
6. $1\frac{3}{8}$
7. $\frac{3}{8}$
8. $\frac{5}{8}$
9. $\frac{7}{8}$
10. $1\frac{1}{8}$
11. $\frac{7}{8}$
12. $1\frac{1}{8}$
13. $1\frac{3}{8}$
14. $1\frac{5}{8}$
15. $\frac{9}{16}$
16. $\frac{11}{16}$
17. $\frac{13}{16}$
18. $\frac{15}{16}$
19. $1\frac{1}{16}$
20. $1\frac{3}{16}$
21. $1\frac{5}{16}$
22. $1\frac{7}{16}$

23. $\frac{5}{16}$
24. $\frac{7}{16}$
25. $\frac{9}{16}$
26. $\frac{11}{16}$
27. $\frac{13}{16}$
28. $\frac{15}{16}$
29. $1\frac{1}{16}$
30. $1\frac{3}{16}$
31. $\frac{13}{16}$
32. $\frac{15}{16}$
33. $1\frac{1}{16}$
34. $1\frac{3}{16}$
35. $1\frac{5}{16}$
36. $1\frac{7}{16}$
37. $1\frac{9}{16}$
38. $1\frac{11}{16}$
39. $\frac{3}{16}$
40. $\frac{5}{16}$

No. 251

1. 1368
2. 2367
3. 3366
4. 4365
5. 5364
6. 5823
7. 6822
8. 7821
9. 8757
10. 1656
11. 2655
12. 3114
13. 4113
14. 5112
15. 6111
16. 7056
17. 8055
18. 8514
19. 1413
20. 2412

No. 252

1. 121
2. 232
3. 343
4. 451
5. 562
6. 623
7. 731
8. 842
9. 953
10. 161
11. 222
12. 333
13. 441
14. 552
15. 663
16. 721
17. 832
18. 943
19. 151
20. 262

No. 253

1. $\frac{7}{16}$
2. $\frac{9}{16}$
3. $\frac{11}{16}$
4. $\frac{13}{16}$
5. $\frac{15}{16}$
6. $1\frac{1}{16}$
7. $\frac{7}{16}$
8. $\frac{9}{16}$
9. $\frac{11}{16}$
10. $\frac{13}{16}$

No. 254

(Annex 0 to Answers to No. 148)

No. 255

1. 131
2. 242
3. 353
4. 464

5. 571
6. 632
7. 743
8. 854
9. 961
10. 172
11. 233
12. 344
13. 451
14. 562
15. 673
16. 734
17. 841
18. 952
19. 163
20. 274

No. 256

1. $\frac{15}{16}$
2. $1\frac{1}{16}$
3. $1\frac{3}{16}$
4. $1\frac{5}{16}$
5. $\frac{11}{16}$
6. $\frac{13}{16}$
7. $\frac{15}{16}$
8. $1\frac{1}{16}$
9. $1\frac{3}{16}$
10. $1\frac{5}{16}$

No. 257

(Annex 0 to Answers to No. 166)

No. 258

1. 141
2. 252
3. 363
4. 474
5. 585
6. 641
7. 752
8. 863
9. 974

10. 185
11. 241
12. 352
13. 463
14. 574
15. 685
16. 741
17. 852
18. 963
19. 174
20. 285

No. 259

1. $\frac{7}{16}$
2. $1\frac{9}{16}$
3. $\frac{15}{16}$
4. $1\frac{1}{16}$
5. $1\frac{3}{16}$
6. $1\frac{5}{16}$
7. $1\frac{7}{16}$
8. $1\frac{9}{16}$
9. $1\frac{11}{16}$
10. $1\frac{13}{16}$

No. 260

(Annex 0 to Answers to No. 166)

No. 261

1. $\frac{1}{3}$
2. $\frac{5}{6}$
3. $\frac{5}{12}$
4. $\frac{3}{4}$
5. $\frac{11}{12}$
6. $1\frac{1}{4}$
7. $\frac{3}{4}$
8. $1\frac{1}{12}$
9. $1\frac{1}{4}$
10. $1\frac{7}{12}$

No. 262

1. 151
2. 262

3. 373
4. 484
5. 595
6. 656
7. 761
8. 872
9. 983
10. 194
11. 255
12. 366
13. 471
14. 582
15. 693
16. 754
17. 865
18. 976
19. 181
20. 292

No. 263

1. $\frac{1}{4}$
2. $\frac{3}{4}$
3. $\frac{1}{8}$
4. $\frac{3}{8}$
5. $\frac{5}{8}$
6. $\frac{7}{8}$
7. $\frac{1}{8}$
8. $\frac{3}{8}$
9. $\frac{5}{8}$
10. $\frac{7}{8}$
11. $\frac{1}{8}$
12. $\frac{3}{8}$
13. $\frac{5}{8}$
14. $\frac{7}{8}$
15. $\frac{1}{16}$
16. $\frac{3}{16}$
17. $\frac{5}{16}$
18. $\frac{7}{16}$
19. $\frac{9}{16}$
20. $\frac{11}{16}$

21. $\frac{13}{16}$
22. $\frac{15}{16}$
23. $\frac{1}{16}$
24. $\frac{3}{16}$
25. $\frac{5}{16}$
26. $\frac{7}{16}$
27. $\frac{9}{16}$
28. $\frac{11}{16}$
29. $\frac{13}{16}$
30. $\frac{15}{16}$

No. 264

(Annex 0 to Answers to No. 172)

No. 265

1. $\frac{1}{16}$
2. $\frac{3}{16}$
3. $\frac{5}{16}$
4. $\frac{7}{16}$
5. $\frac{9}{16}$
6. $\frac{11}{16}$
7. $\frac{13}{16}$
8. $\frac{15}{16}$
9. $\frac{1}{16}$
10. $\frac{3}{16}$

No. 266

1. 141
2. 252
3. 363
4. 474
5. 585
6. 696
7. 747
8. 851
9. 962
10. 173
11. 284
12. 395
13. 446
14. 557
15. 661

16. 772
17. 883
18. 994
19. 145
20. 256

No. 267

1. $\frac{1}{4}$
2. $\frac{7}{12}$
3. $\frac{3}{4}$
4. $1\frac{1}{12}$
5. $\frac{11}{12}$
6. $1\frac{1}{4}$
7. $1\frac{5}{12}$
8. $1\frac{3}{4}$
9. $\frac{5}{6}$
10. $1\frac{1}{6}$

No. 268

(Annex 0 to Answers to No. 179)

No. 269

1. $\frac{5}{16}$
2. $\frac{7}{16}$
3. $\frac{9}{16}$
4. $\frac{11}{16}$
5. $\frac{13}{16}$
6. $\frac{15}{16}$
7. $\frac{1}{16}$
8. $\frac{3}{16}$
9. $\frac{5}{16}$
10. $\frac{7}{16}$

No. 270

1. 131
2. 242
3. 353
4. 464
5. 575
6. 686
7. 797
8. 838
9. 941

10. 152
11. 263
12. 374
13. 485
14. 596
15. 637
16. 748
17. 851
18. 962
19. 173
20. 284

No. 271

1. $\frac{2}{3}$
2. $1\frac{1}{3}$
3. $\frac{5}{12}$
4. $1\frac{1}{12}$
5. $\frac{11}{12}$
6. $1\frac{7}{12}$
7. $\frac{7}{24}$
8. $\frac{17}{24}$
9. $\frac{19}{24}$
10. $1\frac{19}{24}$

No. 272

{Annex 0 to Answers to No. 186)

No. 273

1. $\frac{9}{16}$
2. $\frac{11}{16}$
3. $\frac{13}{16}$
4. $\frac{15}{16}$
5. $\frac{1}{16}$
6. $\frac{3}{16}$
7. $\frac{5}{16}$
8. $\frac{7}{16}$
9. $\frac{9}{16}$
10. $\frac{11}{16}$

No. 274

1. 141
2. 252
3. 363

4. 474
5. 585
6. 696
7. 747
8. 858
9. 969
10. 171
11. 282
12. 393
13. 444
14. 555
15. 666
16. 777
17. 888
18. 999
19. 741
20. 652

No. 275

1. $\frac{23}{24}$
2. $1\frac{5}{24}$
3. $1\frac{11}{24}$
4. $1\frac{17}{24}$
5. $\frac{7}{12}$
6. $\frac{11}{12}$
7. $1\frac{1}{12}$
8. $1\frac{5}{12}$
9. $\frac{1}{2}$
10. $\frac{2}{3}$

No. 276

(Annex 0 to Answers to No. 193)

No. 277

1. $\frac{13}{16}$
2. $\frac{15}{16}$
3. $\frac{1}{16}$
4. $\frac{3}{16}$
5. $\frac{5}{16}$
6. $\frac{7}{16}$
7. $\frac{9}{16}$
8. $\frac{11}{16}$

9. $\frac{13}{16}$
10. $\frac{15}{16}$

No. 278

1. 152
2. 263
3. 374
4. 485
5. 596
6. 647
7. 758
8. 869
9. 973
10. 184
11. 295
12. 346
13. 437
14. 568
15. 679
16. 784
17. 895
18. 946
19. 157
20. 268

No. 279

1. $\frac{5}{8}$
2. $1\frac{1}{8}$
3. $\frac{5}{8}$
4. $1\frac{1}{8}$
5. $1\frac{1}{3}$
6. $1\frac{2}{3}$
7. $\frac{5}{24}$
8. $\frac{13}{24}$
9. $\frac{17}{24}$
10. $1\frac{1}{24}$

No. 280

{Annex 0 to Answers to No. 200)

No. 281

1. $\frac{1}{6}$
2. $\frac{1}{6}$

3. $\frac{1}{12}$
4. $\frac{5}{12}$
5. $\frac{7}{12}$
6. $\frac{11}{12}$
7. $\frac{1}{12}$
8. $\frac{5}{12}$
9. $\frac{7}{12}$
10. $\frac{11}{12}$

No. 282

1. 2r86
2. 2rl29
3. 2rl08
4. 2r347
5. 2r456
6. 2r589
7. 2r312
8. 2rl02
9. 2r208
10. 2rll7
11. 3rl3
12. 3r50
13. 3rl05
14. 3rl82
15. 3r285
16. 4rl26
17. 4r200
18. 4r252
19. 4r282
20. 4r280

No. 283

1. $\frac{11}{24}$
2. $\frac{19}{24}$
3. $\frac{23}{24}$
4. $1\frac{7}{24}$
5. $\frac{17}{24}$
6. $1\frac{1}{24}$
7. $1\frac{5}{24}$
8. $1\frac{13}{24}$
9. $\frac{23}{24}$

10. $1\frac{7}{24}$

No. 284

1. 1066
2. 1377
3. 1708
4. 2059
5. 2511
6. 2912
7. 1023
8. 1394
9. 1326
10. 1647
11. 1988
12. 2349
13. 2821
14. 992
15. 1353
16. 1734
17. 1586
18. 1917
19. 2268
20. 2639

No. 285

1. $\frac{1}{12}$
2. $\frac{5}{12}$
3. $\frac{7}{12}$
4. $\frac{11}{12}$
5. $\frac{1}{12}$
6. $\frac{5}{12}$
7. $\frac{7}{12}$
8. $\frac{11}{12}$
9. $\frac{1}{3}$
10. $\frac{2}{3}$

No. 286

1. 2rl
2. 2r29
3. 2r376
4. 2r551
5. 2r374

6. 3r378
7. 3r518
8. 3r680
9. 3r864
10. 3rl7
11. 4r266
12. 4r225
13. 4rl72
14. 4r93
15. 4rl62
16. 5r90
17. 5rl30
18. 5rl48
19. 5rl44
20. 5rll9

No. 287

1. $1\frac{11}{24}$
2. $1\frac{19}{24}$
3. $\frac{8}{16}$
4. $\frac{1}{2}$
5. $\frac{9}{10}$
6. $1\frac{1}{10}$
7. $\frac{1}{2}$
8. $\frac{7}{10}$
9. $1\frac{1}{10}$
10. $1\frac{3}{10}$

No. 288

1. 1470
2. 1872
3. 2294
4. 2736
5. 3198
6. 3772
7. 1344
8. 1806
9. 1820
10. 2232
11. 2664

12. 3116
13. 3588
14. 1312
15. 1764
16. 2236
17. 2108
18. 2520
19. 2952
20. 3404

No. 289

1. $\frac{1}{6}$
2. $\frac{5}{6}$
3. $\frac{1}{6}$
4. $\frac{19}{24}$
5. $\frac{1}{6}$
6. $\frac{5}{6}$
7. $\frac{1}{6}$
8. $\frac{1}{6}$
9. $\frac{1}{6}$
10. $\frac{1}{6}$

No. 290

1. 2r37
2. 2r771
3. 2rl50
4. 2r85
5. 2r99
6. 3r46
7. 3rl02
8. 3rl70
9. 3r280
10. 3r402
11. 4rl92
12. 4r235
13. 4r276
14. 4r285
15. 4r272
16. 5r67
17. 5r693
18. 5r564

19. 5r632
20. 5r97

No. 291

1. $\frac{7}{10}$
2. $\frac{9}{10}$
3. $1\frac{3}{10}$
4. $1\frac{1}{2}$
5. $\frac{9}{10}$
6. $1\frac{1}{10}$
7. $1\frac{1}{2}$
8. $1\frac{7}{10}$
9. $\frac{7}{10}$
10. $\frac{9}{10}$

No. 292

1. 1892
2. 2385
3. 2898
4. 3431
5. 3984
6. 4557
7. 1683
8. 2236
9. 2332
10. 2835
11. 3358
12. 3901
13. 4464
14. 1617
15. 2193
16. 2756
17. 2772
18. 3510
19. 3818
20. 4371

No. 293

1. $\frac{5}{6}$
2. $\frac{5}{6}$
3. $\frac{5}{6}$

4. $\frac{5}{8}$
5. $\frac{1}{12}$
6. $\frac{5}{12}$
7. $\frac{7}{12}$
8. $\frac{11}{12}$
9. $\frac{1}{12}$
10. $\frac{5}{12}$

No. 294

1. 3r51
2. 3r69
3. 3r95
4. 3r32
5. 3r54
6. 4r226
7. 4r85
8. 4r864
9. 4rll9
10. 4r208
11. 5rl46
12. 5r288
13. 5r321
14. 5r465
15. 5rl08
16. 6rl25
17. 6r200
18. 6r77
19. 6rlll
20. 6r310

No. 295

1. $1\frac{1}{10}$
2. $1\frac{3}{10}$
3. $\frac{3}{5}$
4. $\frac{4}{5}$
5. $1\frac{1}{5}$
6. $1\frac{2}{5}$
7. $\frac{9}{20}$
8. $\frac{13}{20}$
9. $\frac{17}{20}$
10. $1\frac{1}{20}$

No. 296

1. 2332
2. 2916
3. 3520
4. 4144
5. 4788
6. 5452
7. 2006
8. 2684
9. 2862
10. 3456
11. 4070
12. 4704
14. 1972
15. 2596
16. 3599
17. 3392
18. 3996
19. 4620
20. 5264

No. 297

1. $\frac{7}{12}$
2. $\frac{11}{12}$
3. $\frac{1}{12}$
4. $\frac{5}{12}$
5. $\frac{7}{12}$
6. $\frac{11}{12}$
7. $\frac{1}{12}$
8. $\frac{5}{12}$
9. $\frac{7}{12}$
10. $\frac{11}{12}$

No. 298

1. 5r219
2. 5r642
3. 5r312
4. 5r97
5. 5rl06
6. 6r310
7. 6rl50

8. 6rl00
9. 6r609
10. 6rll5
11. 7r65
12. 7rl35
13. 7r235
14. 7rl85
15. 7r64
16. 8r72
17. 8rl25
18. 8rl80
19. 8r360
20. 8r421

No. 299

1. $\frac{7}{20}$
2. $\frac{11}{20}$
3. $\frac{13}{20}$
4. $1\frac{8}{20}$
5. $\frac{13}{20}$
6. $1\frac{8}{20}$
7. $1\frac{7}{20}$
8. $1\frac{11}{20}$
9. $\frac{17}{20}$
10. $1\frac{1}{20}$

No. 300

1. 2790
2. 3465
3. 4160
4. 4875
5. 5610
6. 6365
7. 2380
8. 3105
9. 3410
10. 4095
11. 4800
12. 5525
13. 6270
14. 2345

15. 3060
16. 3795
17. 4030
18. 4725
19. 5440
20. 6175

No. 301

1. $\frac{1}{12}$
2. $\frac{5}{12}$
3. $\frac{7}{12}$
4. $\frac{11}{12}$
5. $\frac{1}{12}$
6. $\frac{5}{12}$
7. $\frac{7}{12}$
8. $\frac{11}{12}$
9. $\frac{1}{12}$
10. $\frac{5}{12}$

No. 302

1. 6rl0
2. 6r29
3. 6r38
4. 6rl65
5. 6r651
6. 7r501
7. 7r307
8. 7r799
9. 7r646
10. 7r20
11. 8rl89
12. 8r612
13. 8r325
14. 8r486
15. 8rl7
16. 9rl25
17. 9rl35
18. 9r74
19. 9r85
20. 9r59

No. 303

1. $1\frac{9}{20}$
2. $1\frac{13}{20}$
3. $\frac{13}{20}$
4. $\frac{21}{20}$
5. $\frac{33}{20}$
6. $\frac{37}{20}$
7. $\frac{9}{20}$
8. $\frac{17}{20}$
9. $\frac{33}{20}$
10. $1\frac{1}{20}$

No. 304

1. 3266
2. 4032
3. 4818
4. 5624
5. 6450
6. 7296
7. 2772
8. 3588
9. 3976
10. 4752
11. 5548
12. 6364
13. 7200
14. 2736
15. 3542
16. 4368
17. 4686
18. 5472
19. 6278
20. 7104

No. 305

1. $\frac{7}{12}$
2. $\frac{11}{12}$
3. $\frac{1}{10}$
4. $\frac{8}{10}$
5. $\frac{7}{10}$
6. $\frac{9}{10}$
7. $\frac{1}{10}$

8. $\frac{3}{10}$
9. $\frac{7}{10}$
10. $\frac{9}{10}$

No. 306

1. 6r706
2. 6r95
3. 6r37
4. 6r38
5. 6r40
6. 7rl8
7. 7rll8
8. 7r211
9. 7r346
10. 7r252
11. 8r28
12. 8r39
13. 8r404
14. 8r355
15. 8r626
16. 9r64
17. 9r301
18. 9r400
19. 9r500
20. 9r65

No. 307

1. $\frac{38}{40}$
2. $\frac{31}{40}$
3. $\frac{38}{40}$
4. $1\frac{7}{40}$
5. $\frac{18}{40}$
6. $\frac{37}{40}$
7. $1\frac{8}{40}$
8. $1\frac{11}{40}$
9. $\frac{38}{40}$
10. $1\frac{1}{40}$

No. 308

1. 3713
2. 4617

3. 5494
4. 6391
5. 7308
6. 8245
7. 3182
8. 4089
9. 4503
10. 5427
11. 6314
12. 7221
13. 8148
14. 3145
15. 4042
16. 4959
17. 5293
18. 6237
19. 7134
20. 8051

No. 309

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

No. 310

1. 7rl29
2. 7r642
3. 7r711
4. 7r32
5. 7r232
6. 8r77
7. 8r444
8. 8r312
9. 8rl47

10. 8r25
11. 9r27
12. 9r297
13. 9r358
14. 9r555
15. 9r609
16. 9r775
17. 9r862
18. 9r927
19. 9rl50
20. 9r215

No. 311

1. $1\frac{9}{40}$
2. $1\frac{17}{40}$
3. $\frac{28}{40}$
4. $\frac{37}{40}$
5. $1\frac{13}{40}$
6. $1\frac{21}{40}$
7. $1\frac{3}{40}$
8. $1\frac{11}{40}$
9. $1\frac{19}{40}$
10. $1\frac{27}{40}$

No. 312

1. 4224
2. 5162
3. 6188
4. 7176
5. 8184
6. 9212
7. 3610
8. 4608
9. 5104
10. 6052
11. 7098
12. 8096
13. 9114
14. 3572
15. 4560
16. 5568

17. 5984
18. 6942
19. 8008
20. 9016

No. 313

1. $\frac{3}{6}$
2. $\frac{4}{6}$
3. $\frac{1}{10}$
4. $\frac{3}{10}$
5. $\frac{7}{10}$
6. $\frac{9}{10}$
7. $\frac{1}{6}$
8. $\frac{2}{6}$
9. $\frac{3}{6}$
10. $\frac{4}{6}$

No. 314

1. $\frac{39}{40}$
2. $1\frac{7}{40}$
3. $1\frac{33}{40}$
4. $1\frac{31}{40}$
5. $\frac{8}{16}$
6. $\frac{11}{16}$
7. $\frac{14}{16}$
8. $1\frac{3}{16}$
9. $\frac{18}{30}$
10. $\frac{19}{30}$

No. 315

1. 4655
2. 5664
3. 6693
4. 7742
5. 8811
6. 9405
7. 3744
8. 4753
9. 5782
10. 6831
11. 7505
12. 8544

13. 9603
14. 3822
15. 4851
16. 5605
17. 6624
18. 7663
19. 8722
20. 9801

No. 316

1. $\frac{1}{10}$
2. $\frac{8}{10}$
3. $\frac{7}{10}$
4. $\frac{9}{10}$
5. $\frac{1}{5}$
6. $\frac{2}{5}$
7. $\frac{2}{5}$
8. $\frac{4}{5}$
9. $\frac{1}{10}$
10. $\frac{3}{10}$

No. 317

1. $1\frac{1}{50}$
2. $1\frac{7}{50}$
3. $1\frac{2}{15}$
4. $1\frac{1}{12}$
5. $1\frac{4}{12}$
6. $1\frac{7}{12}$
7. $\frac{28}{50}$
8. $\frac{29}{50}$
9. $1\frac{11}{44}$
10. $1\frac{17}{50}$

No. 318

1. $\frac{7}{10}$
2. $\frac{9}{10}$
3. $\frac{1}{5}$
4. $\frac{2}{5}$
5. $\frac{2}{5}$
6. $\frac{4}{5}$
7. $\frac{1}{10}$
8. $\frac{3}{10}$

9. $\frac{7}{10}$
10. $\frac{9}{10}$

No. 319

1. 41
2. 51
3. 61
4. 71
5. 81
6. 91
7. 31
8. 41
9. 51
10. 61
11. 71
12. 81
13. 91
14. 31
15. 41
16. 51
17. 61
18. 71
19. 81
20. 91

No. 320

1. $\frac{11}{30}$
2. $\frac{17}{30}$
3. $\frac{23}{30}$
4. $\frac{28}{30}$
5. $\frac{4}{15}$
6. $\frac{7}{15}$
7. $\frac{13}{15}$
8. $1\frac{1}{15}$
9. $1\frac{1}{30}$
10. $1\frac{7}{30}$

No. 321

1. $\frac{1}{6}$
2. $\frac{2}{6}$
3. $\frac{3}{6}$
4. $\frac{4}{6}$

5. $\frac{1}{10}$
6. $\frac{3}{10}$
7. $\frac{7}{10}$
8. $\frac{9}{10}$
9. $\frac{1}{5}$
10. $\frac{2}{5}$

No. 322

1. 42
2. 52
3. 62
4. 72
5. 82
6. 92
7. 32
8. 42
9. 52
10. 62
11. 72
12. 82
13. 92
14. 32
15. 42
16. 52
17. 62
18. 72
19. 82
20. 92

No. 323

1. $1\frac{13}{50}$
2. $1\frac{19}{50}$
3. $\frac{14}{15}$
4. $1\frac{2}{15}$
5. $1\frac{8}{15}$
6. $1\frac{11}{15}$

No. 324

1. $\frac{2}{5}$
2. $\frac{4}{5}$
3. $\frac{1}{10}$
4. $\frac{3}{10}$

5. $\frac{7}{10}$
6. $\frac{9}{10}$
7. $\frac{1}{8}$
8. $\frac{3}{8}$
9. $\frac{3}{8}$
10. $\frac{1}{8}$

No. 325

1. 43
2. 53
3. 63
4. 73
5. 83
6. 93
7. 33
8. 43
9. 53
10. 63
11. 73
12. 83
13. 93
14. 33
15. 43
16. 53
17. 63
18. 73
19. 83
20. 93

No. 327

1. $\frac{1}{10}$
2. $\frac{3}{10}$
3. $\frac{7}{10}$
4. $\frac{9}{10}$
5. $\frac{1}{8}$
6. $\frac{3}{8}$
7. $\frac{3}{8}$
8. $\frac{1}{8}$
9. $\frac{1}{10}$
10. $\frac{3}{10}$

No. 328

1. 44
2. 54
3. 64
4. 74
5. 84
6. 94
7. 34
8. 44
9. 54
10. 64
11. 74
12. 84
13. 94
14. 34
15. 44
16. 54
17. 64
18. 74
19. 84
20. 94

No. 330

1. $\frac{7}{10}$
2. $\frac{9}{10}$
3. $\frac{1}{8}$
4. $\frac{2}{8}$
5. $\frac{3}{8}$
6. $\frac{4}{8}$
7. $\frac{1}{10}$
8. $\frac{3}{10}$
9. $\frac{7}{10}$
10. $\frac{9}{10}$

No. 331

1. 45
2. 55
3. 65
4. 75
5. 85
6. 95
7. 35

8. 45
9. 55
10. 65
11. 75
12. 85
13. 95
14. 35
15. 45
16. 55
17. 65
18. 75
19. 85
20. 95

No. 332

1. 46
2. 56
3. 66
4. 76
5. 86
6. 96
7. 36
8. 46
9. 56
10. 66
11. 76
12. 86
13. 96
14. 36
15. 46
16. 56
17. 66
18. 76
19. 86
20. 96

No. 333

1. $\frac{1}{6}$
2. $\frac{2}{6}$
3. $\frac{3}{6}$
4. $\frac{4}{6}$

5. $\frac{1}{10}$
6. $\frac{3}{10}$
7. $\frac{7}{10}$
8. $\frac{9}{10}$
9. $\frac{1}{6}$
10. $\frac{3}{6}$

No. 334

1. 47
2. 57
3. 67
4. 77
5. 87
6. 97
7. 37
8. 47
9. 57
10. 67
11. 77
12. 87
13. 97
14. 37
15. 47
16. 57
17. 67
18. 77
19. 87
20. 97

No. 335

1. $\frac{3}{6}$
2. $\frac{4}{6}$
3. $\frac{1}{10}$
4. $\frac{3}{10}$
5. $\frac{7}{10}$
6. $\frac{9}{10}$

No. 336

1. 48
2. 58
3. 68
4. 78

5. 88
6. 98
7. 38
8. 48
9. 58
10. 68
11. 78
12. 88
13. 98
14. 38
15. 48
16. 58
17. 68
18. 78
19. 88
20. 98

No. 337

1. 49
2. 59
3. 69
4. 79
5. 89
6. 99
7. 39
8. 49
9. 59
10. 69
11. 79
12. 89
13. 99
14. 39
15. 49
16. 59
17. 69
18. 79
19. 89
20. 99

No. 338

1. .12½

2. .37½
3. .62½
4. .87½
5. .33⅓
6. .66⅔
7. .16⅔
8. .83⅓
9. .20
10. .40
11. .60
12. .80

No. 339

1. 2886
2. 5994
3. 9268
4. 12818
5. 17081
6. 19584
7. 23793
8. 28288
9. 24466
10. 4104

No. 340

1. .06¼
2. .18¾
3. .31¼
4. .43¾
5. .56¼
6. .68¾
7. .81¼
8. .93¾
9. .08⅓
10. .41⅔
11. .58⅓
12. .91⅔
13. .03⅛
14. .04⅛

No. 341

1. 4235

2. 8352
3. 12691
4. 17138
5. 21918
6. 25543
7. 30702
8. 36206
9. 33355
10. 5796

No. 342

1. $17887
2. $9818
3. 9865
4. 25775
5. 39540
6. 23332
7. 17313
8. 31383
9. $14822.40
10. 243062

No. 343

1. 5764
2. 10890
3. 16238
4. 21808
5. 27408
6. 30968
7. 37893
8. 44408
9. 42284
10. 7740

No. 344

1. .0625
2. .1875
3. .3125
4. .4375
5. .5625
6. .6875
7. .8125

8. .9375
9. .0833⅓
10. .4166⅔
11. .5833⅓
12. .9166⅔
13. .0312½
14. .0416⅔

No. 345

1. 7473
2. 13608
3. 19965
4. 26544
5. 33345
6. 37178
7. 44368
8. 52643
9. 51622
10. 9990

No. 346

1. $99.84
2. 96256
3. $117.76
4. 98304
5. 1728
6. $675.84
7. $8120.60
8. $30402.55

No. 347

1. 9362
2. 16506
3. 23872
4. 31460
5. 39270
6. 43952
7. 51748
8. 60168
9. 60946
10. 12222

No. 348

1. .03125
2. .09375
3. .15625
4. .21875
5. .28125
6. .34375
7. .40625
8. .46875
9. .53125
10. .59375
11. .65625
12. .71875
13. .78125
14. .84375
15. .90625
16. .96875
17. .04167
18. .20833
19. .29167
20. .45833
21. .54167
22. .70833
23. .79167
24. .95833

No. 349

1. 10011
2. 18144
3. 26499
4. 35076
5. 43875
6. 52896
7. 57519
8. 66378
9. 68302
10. 12456

No. 350

1. $424575
2. $84770
3. $733779.50

4. $26863.20
5. $830062.74
6. $526.32
7. $981088
8. $9603
9. $1007010

No. 351

1. 10349
2. 19602
3. 28946
4. 38512
5. 48300
6. 58310
7. 68542
8. 72906
9. 74339
10. 12312

No. 353

1. 12408
2. 22428
3. 33033
4. 43608
5. 54405
6. 65424
7. 70965
8. 82368
9. 85272
10. 15219

No. 354

1. $525
2. $756
3. $384
4. $810
5. $5400
6. $900
7. $13000
8. $14700
9. $7200
10. $1600

11. $630
12. $12600
13. $1200
14. $1200
15. $1200

No. 355

1. 14440
2. 25248
3. 36278
4. 47530
5. 59004
6. 61465
7. 72768
8. 84293
9. 95354
10. 19206

No. 357

1. 11211
2. 24642
3. 40051
4. 57902
5. 77691
6. 92412
7. 116081
8. 142272
9. 170321
10. 29032

No. 358

1. $247715.70
2. $243540
3. $60226335
4. $1087638.75
5. $5209451.52
6. $131602.24
7. $40102686.72
8. $8710669

No. 359

1. 24442
2. 49184

3. 76146
4. 104632
5. 136004
6. 156996
7. 191522
8. 229024
9. 268746
10. 47012

No. 361

1. 39693
2. 75746
3. 114019
4. 154512
5. 195853
6. 223096
7. 269709
8. 318542
9. 368063
10. 67596

No. 362

1. 138138
2. 115596
3. 74556
4. 186960
5. 89301
6. 235872
7. 119782
8. 73248
9. 193256

No. 363

1. 56964
2. 104328
3. 153912
4. 205716
5. 259740
6. 291014
7. 348928
8. 409062
9. 471416

10. 91390

No. 364

1. 210
2. 342
3. 255
4. 240
5. 195
6. 247
7. 272
8. 224
9. 361

No. 365

1. 76255
2. 134930
3. 195825
4. 258940
5. 324275
6. 364080
7. 429965
8. 501400
9. 575055
10. 115430

No. 366

1. $56496
2. $799018
3. $5663152
4. $410091.55
5. $453952.95
6. $36033.25
7. $530895.75
8. $1043606.30

No. 367

1. 85446
2. 155232
3. 227238
4. 301464
5. 377910
6. 456576
7. 497502

8. 575276
9. 659932
10. 120408

No. 368

1. $139510.50
2. $147804.75
3. $158233.30
4. $131011.65
5. $452339.40
6. $754503.75
7. $151524.65
8. $238939.80

No. 369

1. 92617
2. 173514
3. 256631
4. 341968
5. 429525
6. 519302
7. 611299
8. 651126
9. 740567
10. 121144

No. 370

1. 5476
2. 8649
3. 6724
4. 4096
5. 1444
6. 12544
7. 15376
8. 21316
9. 28224
10. 38809
11. 1236544
12. 1471369
13. 1726596
14. 2298256
15. 2954961

No. 371

1. 113928
2. 206136
3. 300564
4. 397212
5. 496080
6. 597168
7. 648396
8. 753324
9. 860472
10. 153558

No. 372

1. 7616
2. 12561
3. 15824
4. 22425
5. 40716
6. 42749
7. 421056
8. 224196
9. 198989

No. 373

1. 138168
2. 241697
3. 347446
4. 455415
5. 565604
6. 620473
7. 734502
8. 850751
9. 962297
10. 183816

No. 374

1. 8556
2. 4030
3. 7308
4. 8924
5. 45795
6. 100152

7. 173888
8. 264171
9. 837221

No. 375

1. 2025
2. 3025
3. 4225
4. 5625
5. 7225
6. 9025
7. 13225
8. 18225
9. 24025
10. 30625
11. 38025
12. 99225
13. 112225
14. 126025
15. 140625

No. 376

1. 621
2. 2009
3. 1224
4. 11021
5. 13216
6. 24024
7. 30616
8. 27209
9. 38016

No. 377

1. 275625
2. 390625
3. 680625
4. 1050625
5. 1500625
6. 1755625
7. 2640625
8. 2975625
9. 3330625

10. 3705625

No. 378

1. 4896
2. 6391
3. 8084
4. 12019
5. 16851
6. 22484
7. 25536
8. 32351
9. 36036

No. 379

1. $90\frac{8}{9}$
2. $112\frac{8}{25}$
3. $160\frac{5}{12}$
4. $339\frac{1}{6}$
5. $12\frac{3}{5}$
6. $3681\frac{9}{20}$
7. $1625\frac{3}{32}$
8. $650\frac{8}{25}$
9. $28\frac{7}{8}$
10. $72\frac{11}{12}$
11. $42\frac{15}{44}$
12. $152\frac{5}{21}$

No. 380

1. 276
2. 800
3. $929\frac{1}{3}$
4. 950
5. 2552
6. 5952
7. 1422
8. 2100
9. 3363

No. 381

1. 23.2
2. 45
3. 36
4. 3.5

5. 5.12
6. 13.05
7. 10.18
8. 61.2
9. 77.6

No. 382

1. 2744
2. 19683
3. 35937
4. 97336
5. 205379
6. 238328
7. 274625
8. 357911
9. 389017
10. 592704
11. 636056
12. 681472
13. 857375
14. 912673
15. 970299