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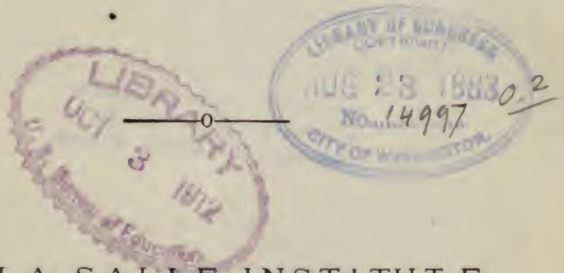

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PRIMARY

ARITHMETIC.

Introductory Definitions.

—:o:—

1. ***Arithmetic*** is the *science* of *numbers*, and also the *art* of *computation*.

2. ***Number*** is the *result* of the *comparison* of a *quantity* with *unity*.

3. ***Quantity*** is any thing that can be increased or diminished; as, the *length* of a road, the *surface* of a body, the *weight* of an article.

4. A ***Unit*** is a quantity with which we compare others of the same kind.

5. The comparison of quantity with unity produces three kinds of numbers: *Integers*, *Fractions*, and *Mixed Numbers*.

6. An ***Integer*** is a number which contains its unit an exact number of times; as, 12, 15; 6 boys, 4 apples.

7. A ***Fraction*** is a number which is less than a unit; as, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{7}{8}$.

8. A ***Mixed Number*** consists of an integer and a fraction. Thus, $1\frac{1}{2}$, $2\frac{1}{3}$, $4\frac{1}{4}$.

9. According to the nature of their unit, numbers are divided into two classes; viz., *Abstract* and *Concrete*.

10. An ***Abstract Number*** is a number the nature of whose unit is not determined; as, 16, 425, 7840.

11. A ***Concrete Number*** is a number the nature of whose unit is determined; as, 16 men, 425 days, 7840 dollars.

NUMERATION AND NOTATION.

———:o:———

12. ***Numeration*** is the method of reading numbers expressed by characters.

13. ***Notation*** is the method of writing numbers.

14. Numbers may be represented as follows:

I. By *words;* as, one, two, three.

II. By *figures*, called the *Arabic Method;* as, 1, 2, 3.

III. By *letters*, called the *Roman Method;* as, I, V, X, C.

15. In the ***Arabic Method,*** numbers are expressed by the following ten

Figures : 1, 2, 3, 4, 5, 6, 7, 8, 9, 0.

Names : One, Two, Three, Four, Five, Six, Seven, Eight, Nine, Naught

PRINCIPLE.

A simple name is given to each of the first nine numbers, of which groups are formed. These groups also receive, each, a particular name, and are numbered by the simple names of the first numbers.

16. The first nine figures are called *significant* because they represent a value. But the tenth, by itself, represents nothing. It is only an auxiliary figure: its office being to hold the place of an order

whatever, when there are no units of that order in the number.

17. Each of the first nine numbers expresses simple units, or units of the *first order*.

18. The number which follows the ninth is called *ten*. It is represented by writing the figure 1 with a naught after it; thus, 10.

19. *Ten* is the unit of the *second* order, and is equal to ten units of the *first* order.

20. We count by tens as we count by simple units, saying: *one ten, two tens, three tens, nine tens.* But custom has replaced these words by the following:

Twenty,	20	Sixty,	60
Thirty,	30	Seventy,	70
Forty,	40	Eighty,	80
Fifty,	50	Ninety,	90

Note—The "ty" in these words signifies ten.

21. The names of the numbers included between two consecutive tens, are formed by joining to the name of the first of these tens, the name of each of the first nine numbers, saying:

Twenty-one,	21	Thirty-one, &c.	31, &c.
Twenty-two,	22	Forty-one, &c.	41, &c.
Twenty-three,	23	Fifty-one, &c.	51, &c.
Twenty-four,	24	Sixty-one, &c.	61, &c.
Twenty-five,	25	Seventy-one, &c.	71, &c.
Twenty-six,	26	Eighty-one, &c.	81, &c.
Etc.	Etc.	Ninety-one, &c.	91, &c.

The highest number expressed by two figures, being ninety-nine, 99.

22. But instead of saying ten and one, ten and two, ten and three, ... ten and nine, custom has adopted the expressions :

Eleven,	11	Sixteen,	16
Twelve,	12	Seventeen,	17
Thirteen,	13	Eighteen,	18
Fourteen,	14	Nineteen,	19
Fifteen,	15		

NOTE.—The "teen" in the words thirteen, etc., to nineteen, means *ten*. So that, strictly speaking, thirteen means three and ten; fourteen, four and ten ; etc.

EXERCISES.

Copy and read the following numbers, naming the *tens* and *units* in each:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
17	28	55	53	85	29	70	73
12	26	22	87	44	10	89	98
11	30	37	62	33	61	64	72
16	90	48	32	67	99	23	27
13	79	40	43	97	21	14	58
37	69	31	34	79	33	74	80
46	59	19	50	60	54	82	49

Express the following numbers by figures :

1. Ten.	9. Eighty-six.	17. Seventy-six.
2. Thirty-seven.	10. Ninety-eight.	18. Sixty-eight.
3. Seventeen.	11. Thirteen.	19. Eighteen.
4. Fifty-eight.	12. Forty-five.	20. Forty-four.
5. Forty-three.	13. Thirty-six.	21. Sixteen.
6. Twenty-one.	14. Forty-seven.	22. Seventy.
7. Forty-two.	15. Eleven.	23. Nineteen.
8. Twenty-three.	16. Ninety-seven.	24. Twelve.

25. Twenty-six.	33. Eighty.	41. Eighty-three.
26. Seventy-one.	34. Twenty-four.	42. Fifty-six,
27. Fifty-one.	35. Thirty-seven.	43. Fifty-nine.
28. Sixty-three.	36. Sixty-two.	44. Seventy-eight.
29. Thirty-nine.	37. Twenty.	45. Forty-six.
30. Fifty.	38. Twenty-eight.	46. Sixty-three.
31. Fifteen.	39. Forty.	47. Ninety-two.
32. Seventy-nine.	40. Sixty.	48. Eighty-seven.

23. The number which follows ninety-nine (99) is called *hundred*. It is represented by writing 1 with two naughts after it; thus, 100.

24. *One hundred* is the unit of the *third order*, and is equal to ten units of the *second order*.

25. We count by hundreds as we count by units, saying:

One hundred,	100,	Five hundred,	500.
Two hundred,	200.	Six hundred,	600.
Three hundred,	300.	Seven hundred,	700.
Four hundred,	400.	Eight hundred,	800.

Nine hundred 900.

26. The names of the numbers included between two consecutive hundreds, are formed by joining, successively, to the name of the first of these hundreds, the names of all the numbers less than one hundred; thus,

One hundred one,	101.
One hundred two,	102.
One hundred three,	103.
One hundred four,	104.
One hundred five,	105.

One hundred six,	106.
One hundred seven,	107.
One hundred eight,	108.
One hundred nine,	109.
One hundred ten,	110.
Two hundred eleven,	211.
Three hundred twelve	312.
Four hundred thirteen,	413.
Five hundred fourteen,	514.
Six hundred fifteen,	615.
Seven hundred sixteen,	716.
Eight hundred seventeen,	817.
Nine hundred eighteen,	918.
One hundred nineteen,	119.
Two hundred twenty,	220.
Three hundred thirty-one,	331.
Four hundred forty-two,	442.
Five hundred fifty-three,	553.
Six hundred sixty-four,	664.
Seven hundred seventy-five,	775.
Eight hundred eighty-six,	886.
Nine hundred ninety-seven,	997.
Nine hundred ninety-eight,	998.

Nine hundred ninety-nine (999) is the highest number that can be expressed by three figures.

27. The group comprising the first three orders of units, viz., *units*, *tens*, and *hundreds*, constitutes the *first period*, that of simple units.

EXERCISES.

Copy and read the following numbers, naming the *hundreds*, *tens*, and *units* in each:

(1.)	(2.)	(3.)	(4.)	(5.)	(6.)
100	509	224	861	652	278
211	256	297	598	720	122
121	905	337	250	862	972
700	840	103	305	722	605
306	273	110	606	465	334
426	590	733	467	533	407
900	406	892	850	573	863
640	634	920	670	798	580
723	777	701	999	877	121
572	308	620	202	346	313
248	407	800	706	723	816
309	863	462	501	244	911

Express the following numbers in figures:

1. Three hundred seventy-six.
2. Nine hundred sixty-eight.
3. Five hundred forty-three.
4. Six hundred eighty-four.
5. Six hundred twenty-three.
6. Nine hundred eighty-three.
7. Eight hundred twenty-three.
8. Five hundred ninety-five.
9. Three hundred forty-seven.
10. One hundred thirty-eight.
11. Two hundred fifty-two.
12. Nine hundred sixty-one.
13. Four hundred ninety-seven.
14. Nine hundred eighty-two.

15. Three hundred forty-five.
16. Seven hundred nine.
17. Eight hundred two.
18. Five hundred seventy-two.
19. Seven hundred two.
20. Six hundred fifty-four.
21. One hundred seventy.
22. Three hundred twenty-nine.
23. Nine hundred nine.
24. Six hundred five.
25. Seven hundred sixty.
26. Four hundred seventy.
27. Three hundred twenty-seven.
28. Five hundred ninety-seven.
29. Four hundred ninety.
30. Two hundred eighty-four.
31. Four hundred seventy-five.
32. One hundred one.
33. One hundred two.
34. Seven hundred seven.
35. Seven hundred seventy.
36. Eight hundred eighty.
37. Five hundred sixty-one.
38. Nine hundred ninety-nine.
39. Eight hundred.
40. Three hundred thirty-three.

28. The number which follows 999 is called *thousand*, and is represented by writing the figure 1 with three naughts after it; thus, 1000.

29. *Thousand* is the unit of the *second period.* The period of *thousands*, like that of simple units, com-

prises units, tens, and hundreds. The units of thousands, tens of thousands, and hundreds of thousands, constitute the fourth, fifth, and sixth orders of units.

The units of thousands are :

One thousand, two thousand, ... nine thousand.
1000, 2000, 9000.

The tens of thousands are :

ten thousand, twenty thousand, . . ninety thousand.
10000, 20000, 90000.

The hundreds of thousands are :

one hundred thousand, two hundred thousand,
100000, 200000,
. . . . . nine hundred thousand.
900000.

30. The names of the numbers between two consecutive *orders* of thousands, are formed by joining, successively, to the name of the first of these orders, the names of all the numbers less than this order. In this manner we reach the number 999999.

EXERCISES.

Copy and read the following numbers :

I.

(1.)	(2.)	(3.)	(4.)	(5.)	(6.)
1831	1030	9184	2040	2983	8899
4785	2686	1025	3107	3174	5580
7340	1522	2222	5043	4065	1001
6837	7403	6807	7041	7831	2050
8001	5465	5273	7856	4563	3307
8788	1401	6600	4624	4000	3009
2027	6434	1020	4862	5980	2010
1456	8573	5409	4709	1036	3008

II.

(7.)	(8.)	(9.)	(10.)	(11.)
15462	63041	68489	25738	71392
21009	79825	73401	10506	59989
30450	38678	39632	81911	63009
78921	10909	71854	12134	24784
44333	80006	27374	10096	87004

III.

(12.)	(13.)	(14.)	(15.)	(16.)
442839	905497	634584	251206	990098
756351	680329	100091	358192	431960
296426	751341	390400	876538	829473
807905	608315	745001	704115	110018
431900	917823	370492	171211	980703

Express in figures, the following:

I.

1. One thousand, eight hundred eighty-two.
2. Three thousand, nine hundred four.
3. Two thousand, nine.
4. One thousand, eight hundred sixty-three.
5. Seven thousand, five hundred forty-one.
6. Nine thousand, forty-seven.
7. Six thousand, three hundred eighty-four.
8. Nine thousand, one hundred twenty-seven.
9. Six thousand, five hundred eighty-nine.
10. Three thousand, one hundred five.
11. One thousand, one hundred twenty-two.
12. One thousand, three hundred fifty-five.
13. Eight thousand, eight hundred ninety-seven.
14. Six thousand, three hundred forty.
15. Eight thousand, eight hundred ninety-six.

16. Four thousand, eight hundred seventy-one.
17. Five thousand, six.
18. Three thousand, nine hundred forty-five.
19. Eight thousand, thirty.
20. Two thousand, nine hundred eighty-seven.

II.

21. Thirty-one thousand, two hundred.
22. Seventy thousand, eighty-four.
23. Eighty-seven thousand, six.
24. Ten thousand, one.
25. Twenty thousand, two hundred two.
26. Fifteen thousand, eight hundred forty.
27. Twelve thousand, three hundred seventeen.
28. Twenty-five thousand, eight hundred nine.
29. Sixty-three thousand, seven hundred one.
30. Forty-four thousand, nine hundred sixty-three.
31. Seventy-six thousand, eight hundred ten.
32. Ninety-nine thousand, four hundred, twenty-five.
33. Eighty-six thousand, nine hundred ninety-nine.
34. Sixty-one thousand, two.
35. Ten thousand,ten.

III.

36. Eight hundred six thousand, nine hundred seven.
37. Five hundred twenty-seven thousand, eight hundred two.
38. Six hundred twenty-five thousand, nine hundred.
39. Six hundred twelve thousand, one hundred thirty-six.

40. Nine hundred thousand, six.

41. One hundred twenty-one thousand, three hundred nineteen.

42. Eight hundred thousand.

43. Eight hundred twenty-five thousand, eight.

44. Six hundred eleven thousand, ninety-four.

45. Nine hundred forty thousand, thirty.

46. Eight hundred nine thousand.

47. One hundred sixty-one thousand, seven hundred eighty-four.

48. Three hundred ninety-one thousand, two hundred eleven.

49. One hundred ninety-nine thousand, nine hundred ninety-nine.

50. Six hundred forty-four thousand, nine hundred.

31. Continuing in the same manner, we form the next higher periods, *Millions*, *Billions*, *Trillions*, &c.

Million is the unit of the *third* period; billion, the unit of the *fourth* period; and trillion, the unit of the *fifth* period.

These three periods, like *units* and *thousands*, comprise, each, three orders; viz., the order of units, that of tens, and that of hundreds.

32. The names of the various numbers included between their several orders are formed in the same way as those included between the several orders of thousands.

PRINCIPLE.

Every figure placed to the left of another, represents units ten times greater than those of the other; in other words, it represents units of the next higher order.

33. From this principle it follows :

I. A figure standing alone, or in the first place at the right of other figures, expresses units.

II. A figure standing in the second place, counting from the right, expresses tens ; in the third place, hundreds ; in the fourth place, thousands ; &c.

III. It is necessary to have one figure to represent a number having only simple units ; two, for one having tens ; three, for one having hundreds ; four, for one having thousands ; &c, according to the order of the units.

34. Every significant figure has two values. One is called its *simple*, or *absolute* value ; and the other, its *local*, or *relative* value.

The *Simple Value* of a figure is that given to it by its form.

The *Local Value* is that which it receives from the place that it occupies in the number.

Thus in the number 4306, the simple value of the first figure to the left is 4 ; and its local value is 4 units of thousands.

PRINCIPLES.

I. Ten units of any order whatever, form one unit of the next higher order.

II. A thousand units of any period, is equal to one unit of the next higher period.

35. For convenience in reading and writing numbers, the figures are divided into *periods*, each of which comprises three places. The *first three* places

constitute the *first*, or *units* period; the second three places constitute the *second*, or *thousands* period; &c.

36. This division of the periods will be easily understood by a careful examination of the following

NUMERATION TABLE.

NAMES OF ORDERS.	Hundreds of Trillions.	Tens of Trillions.	Units of Trillions.	Hundreds of Billions.	Tens of Billions.	Units of Billions.	Hundreds of Millions.	Tens of Millions.	Units of Millions.	Hundreds of Thousands.	Tens of Thousands.	Units of Thousands.	Hundreds.	Tens.	Units.
NAMES OF PERIODS.	Trillions,			Billions,			Millions,			Thousands,			Units.		
NUMBER.	8	4	0	6	2	5	0	7	4	5	0	3	0	4	0
ORDERS.	15th.	14th.	13th.	12th.	11th.	10th.	9th.	8th.	7th.	6th.	5th.	4th.	3d.	2d.	1st.
PERIODS.	5th.			4th.			3d.			2d.			1st.		

37. If it be required to read or write numbers above trillions, the following is the order of some of the next higher periods: *Quadrillions, Quintillions, Sextillions, Septillions, Octillions, &c.*

EXERCISES IN NUMERATION.

After the foregoing explanations, the pupils should be able to read any number whatever according to the following

RULE.

I. Beginning at the right hand, arrange the figures in periods of three figures each.

II. Then, beginning at the left, read each period in succession, omitting to name the last.

NOTE.—If an order, or even an entire period, be wanting, we do not mention it. We also omit to name the last or units period because it is understood.

1. What number is expressed by 75346821?

SOLUTION.—Separating these figures into periods according to the rule, we have 75, 346, 821. The third period is 75 *millions*; the second is 346 *thousands*; and the first is 821 *units*; hence the number is 75 millions, 346 thousands, 821.

Read the following numbers:

I.

(1.)	(2.)	(3.)	(4.)	(5.)
75	972	1008	60001	704825
63	840	5000	73182	659037
37	569	6300	39502	954308
25	708	2501	18007	100716
12	411	15784	40905	536900
50	4934	29092	56000	213472
225	6527	56311	171360	360005
121	4025	12102	562984	800001
309	7690	20976	630192	780602

II.

(6.)	(7.)	(8.)
2198765	23782621	978564123
3779843	48631425	806273871
3211673	77666555	552118622
7864321	43125789	486374628
5623102	52706000	111222333
5482200	60300001	709080062
9180406	72060384	203100000
4706204	10010010	840601007
7601036	83000505	320000006
4073208	75860207	786400200
1405060	31500004	842900601
8880808	90088050	120340560
8006807	60500283	400300600
6000011	20002021	910004576
2090001	53700006	475462394
2390086	69014739	800006301

III.

(9.)	(10.)
4072634	3563400024
82791640	7462007302
7006	82367400210
984270	53024046070
400200	86920000030
1807	17629080406
62876000	294635112211
900040	909009008007
900000800	842780062004
3742680002	1303000170410
8632073009	3278642197416
862794846704	14000075001004
2872819642	167008634216786
3400641111	3462184390075819

EXERCISES IN NOTATION.

RULE.

I. Beginning at the left, and with the highest period, write the hundreds, tens, and units of each period in the number.

II. Fill all vacant places with naughts.

1. Express in figures the number *two thousand four hundred three.*

SOLUTION.—This number consists of two periods, *thousands* and *units*. In the *thousands* period there is but one order, which is 2 units of thousands. We, therefore, write 2 thousands in the fourth place, 4 hundreds in the third place, a naught (0) in the second place, there being no *tens*, and 3 units in the first place. Hence these figures, 2403, are the proper expression for the given number.

Express the following numbers in figures:

I.

2. Thirteen. Eleven. Seventeen.
3. Nineteen. Thirty-four. Eighty-two.
4. Fifty-five. Ninety-four. Forty-three.
5. Seventy-two. Twenty-nine. Thirty-one.
6. Eighty-eight. Seventy-seven. Fifty-five.
7. Forty-nine. Twenty-six. Eighty-nine.
8. Ninety-two. Thirty. Seventy-three.
9. One hundred five. One hundred eleven.
10. Three hundred ten. Two hundred sixty-five.
11. Four hundred nine. Three hundred twelve.
12. Five hundred thirty-eight. Six hundred eighty-one.
13. Nine hundred thirty-two. Eight hundred ninety-nine.
14. Three hundred sixty. Five hundred eighty-two.
15. Nine hundred twelve. Three hundred fourteen.
16. Seven hundred nineteen. Nine hundred three.

17. Three hundred twenty-two. Two hundred sixty-six.
18. Seven hundred eighty-eight. Four hundred four.
19. Five hundred twenty-eight. Eight hundred twenty-five.
20. Three hundred eighty-five. Six hundred sixty.
21. Seven thousand, sixty. Six thousand, seven.

II.

22. Nine thousand, seven hundred eight.
23. Three thousand, seven hundred fourteen.
24. Three thousand, two hundred forty-five.
25. Seven thousand, six hundred ninety.
26. Three thousand, seven hundred fifty.
27. One thousand, four hundred seven.
28. Two thousand, two hundred seventeen.
29 Seven thousand, three hundred twelve.
30. Two thousand, four hundred ten.
31. Three thousand, eight hundred twenty.
32. One thousand, nine hundred four.
33. Seven thousand, six hundred.
34. Six thousand, four hundred sixteen.
35. Four thousand, one hundred twenty.
36. Six thousand, two. One thousand, one.
37. Eighteen thousand, seven hundred. Forty thousand, six.
38. Fifty thousand, eight hundred forty-one.
39. Seventy-three thousand, one hundred twenty-nine.
40. Eighty-seven thousand, four hundred twenty-two.
41. Seventy thousand, one. Twenty-four thousand.

42. Twenty-four thousand, nine hundred sixty-eight.

43. Twenty-nine thousand, two hundred.

44. Seventeen thousand, one hundred ten.

45. Forty thousand, three hundred ninety.

46. Twelve thousand, eighty. Six thousand, two.

47. Nineteen thousand, sixty-two.

48. Ten thousand, one hundred ten.

49. Twenty-three thousand, five hundred eighty-nine.

III.

50. Sixty-three thousand, twenty.

51. One hundred forty thousand, five hundred seventy-five.

52. Two hundred ninety-one thousand, seven hundred forty six.

53. Nine hundred sixty thousand, ninety.

54. Nine hundred thousand, nine.

55. Three million, five thousand, one.

56. Five hundred million, five hundred.

57. Six hundred million, five thousand, four hundred seventeen.

58. One hundred eleven million, one hundred eleven.

59. Two hundred ninety-seven thousand, forty one.

60. Four billion, six million, one.

61. Five billion, seven million, two thousand, five.

62. Eleven million, eleven.

63. Four hundred six thousand, seven hundred eight.

64. Eight hundred nine thousand, sixty-five.

65. Two trillion, twenty five million, five.

66. Sixty-six million, ten thousand, nineteen.

67. Fourteen million, thirty-five thousand, one hundred ninety-four.

68. One million, three.

69. Seven million, three hundred thousand, ninety-four.

70. Forty million, four thousand, seven hundred.

71. Six hundred three million, fifteen thousand, sixty-one.

72. Fifteen billion, seventy-one million, six thousand, four hundred.

73. Three hundred thousand, five hundred eighty-two.

74. Two hundred million, fourteen thousand, one hundred.

75. Eight hundred thirty billion, twenty thousand twenty-two.

76. Five million, two hundred six thousand, nineteen.

77. Nine hundred billion, sixteen million, eight thousand.

78. One hundred nine million, four hundred twenty thousand.

79. Five hundred twenty-one million, three thousand ten.

80. One hundred two billion, two hundred seventy thousand, ten.

81. Twenty-seven billion, fifty million, five hundred ninety-one.

82. Three hundred million, seventy thousand, nine hundred.

83. Three trillion, one hundred twenty billion, two million, five thousand one.

84. Thirty-seven trillion, one billion, ninety-nine.

85. Four trillion, eighty-one billion, one thousand, two.

ROMAN NOTATION.

38. In the *Roman Method* of Notation, numbers are expressed by the following seven letters of the Roman Alphabet:

Letters.	I,	V,	X,	L,	C,	D,	M.
Values.	1,	5,	10,	50,	100,	500,	1000.

PRINCIPLES.

I. The value of the letter is repeated as often as the letter itself is repeated; as, III expresses the number three; XX, expresses twenty.

II. A letter placed to the right of one of greater value, adds its own to that of the other; as, XV represents fifteen; VII, seven.

III. The value of a letter placed to the left of one of greater value, must be subtracted from that of the other; as, IV expresses four; IX, nine.

IV. The value of a letter or a combination of letters, is increased a thousand-fold by placing a dash over it. Thus, $\overline{X}$, $\overline{LX}$, denote, respectively, ten thousand, and sixty thousand.

NOTE.—I. If a letter that denotes a less number be placed between two that denote greater numbers, it diminishes the latter, but does not affect the former. Thus in the combination LIX, the value of I must be taken from that of X. Hence the number expressed is fifty-nine. (59)

II. It must also be observed that no letter is written four times in succession.

39. The application of these principles is shown in the following

TABLE.

I	One	XIX	19
II	Two	XX	20
III	Three	XXX	30
IV	Four	XL	40
V	Five	L	50
VI	Six	LX	60
VII	Seven	LXX	70
VIII	Eight	LXXX	80
IX	Nine	XC	90
X	Ten	C	100
XI	Eleven	CC	200
XII	Twelve	CD	400
XIII	Thirteen	D	500
XIV	Fourteen	DC	600
XV	Fifteen	CM	900
XVI	Sixteen	M	1000
XVII	Seventeen	MM	2000
XVIII	Eighteen	MDCCCLXXXIII	1883

NOTE.—This system of notation is named after the Romans by whom it was invented and used. It is now principally confined to numbering chapters, sections of books, public documents, &c.

EXERCISES.

Read the following numbers and express them in figures.

(1.)	(2.)	(3.)	(4.)
IV	XXII	LXXXIII	LXVIII
XV	XXXII	XIV	LXXXIV
XLIV	XVI	LXXXVIII	XLII
LXXV	LV	LXX	LXXIII
XXVIII	LI	LIX	X
XXXIX	LXII	XCIII	XIX
XI	XCI	XXIII	XLIX
XLIX	LXXVIII	XCVII	XXXIII

(5.)	(6.)	(7.)
CCXLIX	DCVIII	CXVIII
DXXVI	CXIV	DCLIII
CMLX	DCCCXCI	DCCXLIII
CDXXVI	DCCLXXVII	CCCLXXXI

(8.)	(9.)
MDCCCLXXII	MMDXCVII
MCDXXII	MDCXLVI
$\overline{\text{V}}$DCCXI	L$\overline{\text{IX}}$V
$\overline{\text{I}}\overline{\text{V}}$XC	$\overline{\text{M}}$DXLIX

(10)

MMCXXIV

$\overline{\text{C}}\overline{\text{D}}$XXXIX

$\overline{\text{X}}\overline{\text{X}}$VLX

MI

Write the following numbers by the *Roman Method:*

(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)
17	24	34	30	830	462	262
45	18	46	67	561	689	109
63	57	12	70	326	984	476
71	64	89	82	279	533	324
25	38	77	96	195	372	712
36	27	98	60	914	607	416
52	13	41	29	182	309	967

(8.)	(9.)	(10.)	(11.)	(12.)
1876	1776	2132	2358	6908
1882	1860	3004	3422	12674
1512	1783	4040	4004	11492
1492	2579	7632	8743	21800

(13.)	(14.)	(15.)	(16.)	(17.)	(18.)	(19.)
16	51	62	38	83	37	40
22	63	19	47	90	26	68
34	42	48	52	10	14	13
18	80	25	60	33	85	55
12	14	61	11	59	96	87
29	15	20	41	64	70	38
43	30	92	73	79	65	44

(20.)	(21.)	(22.)	(23.)	(24.)
1342	1462	5048	3658	4019
1635	1184	2732	4632	6920
1883	1293	1764	9004	1099
1296	1935	1590	2861	5009

ADDITION.

——:o:——

40. Addition is the process of finding the sum of two or more numbers.

ADDITION TABLE.

0 and any number make that number : 0 and 1 are 1; 0 and 2 are 2.
Any number and 0 make that number : 1 and 0 are 1; 2 and 0 are 2.

1 and 1 are 2	6 and 1 are 7	8 and 3 are 11
2 and 1 are 3	6 and 2 are 8	8 and 4 are 12
2 and 2 are 4	6 and 3 are 9	8 and 5 are 13
3 and 1 are 4	6 and 4 are 10	8 and 6 are 14
3 and 2 are 5	6 and 5 are 11	8 and 7 are 15
3 and 3 are 6	6 and 6 are 12	8 and 8 are 16
4 and 1 are 5	7 and 1 are 8	9 and 1 are 10
4 and 2 are 6	7 and 2 are 9	9 and 2 are 11
4 and 3 are 7	7 and 3 are 10	9 and 3 are 12
4 and 4 are 8	7 and 4 are 11	9 and 4 are 13
5 and 1 are 6	7 and 5 are 12	9 and 5 are 14
5 and 2 are 7	7 and 6 are 13	9 and 6 are 15
5 and 3 are 8	7 and 7 are 14	9 and 7 are 16
5 and 4 are 9	8 and 1 are 9	9 and 8 are 17
5 and 5 are 10	8 and 2 are 10	9 and 9 are 18

ORAL EXERCISES.

I.

How many are

2 and 1?	4 and 1?	1 and 1?	6 and 4?
1 and 8?	3 and 4?	5 and 6?	8 and 8?
3 and 1?	3 and 0?	4 and 5?	7 and 8?
0 and 4?	6 and 3?	5 and 4?	5 and 3?
5 and 2?	7 and 2?	1 and 9?	9 and 7?
2 and 2?	4 and 4?	7 and 3?	4 and 8?
3 and 2?	0 and 2?	6 and 2?	0 and 6?
6 and 1?	9 and 4?	3 and 9?	2 and 8?
4 and 2?	3 and 8?	5 and 7?	9 and 6?
8 and 0?	0 and 1?	7 and 6?	8 and 5?

II.

What is the sum of

3+3?	9+8?	2+3?	4+7?
7+4?	9+9?	3+4?	7+8?
9+2?	5+0?	5+8?	4+9?
6+8?	0+3?	6+9?	1+8?
0+7?	7+1?	6+7?	2+6?
4+0?	6+6?	4+6?	3+5?
7+7?	7+9?	3+8?	2+7?
5+1?	0+9?	5+5?	2+9?
9+5?	3+6?	7+0?	0+8?
8+9?	4+8?	5+6?	5+9?

III.

1. 6 bats and 3 bats are how many bats?
2. 4 boys and 5 boys are how many boys?
3. 7 dollars and 2 dollars are how many dollars?
4. 2 cents and 5 cents are how many cents?
5. 4 girls and 3 girls are how many girls?

6. 7 houses and 5 houses are how many houses?

7. 5 fishes and 8 fishes are how many fishes?

8. 9 tops and 1 top are how many tops?

9. A boy paid 1 cent for a stick of candy and 2 cents for an apple; how many cents did both cost?

SOLUTION.—If a stick of candy cost 1 cent, and an apple cost 2 cents, both must cost the sum of 1 cent and 2 cents. The sum of 1 cent and 2 cents is 3 cents. Therefore both cost 3 cents.

10. John's father gave him two apples, and his mother gave him two more; how many apples had John then?

11. George had 4 chestnuts and Joseph gave him 3; how many had George then?

12. If a pencil cost 2 cents, and a copy 6 cents, how many cents will both cost?

13. William lost 7 marbles and has 6 remaining; how many had he at first?

14. There are 8 birds on one tree, and 9 on another; how many birds on both trees?

15. There are 4 hens in one coop, and 5 in another; how many hens in both coops?

16. I travelled 4 miles one day, and 7 miles the next; how many miles did I travel?

17. There are 6 eggs in one nest, and 8 in another; how many eggs in both nests?

18. Paid 5 cents for a kite, and 9 cents for some string; how much did both cost?

19. A man bought 3 horses on Wednesday and 9 on Saturday; how many horses did he buy?

20. James put 8 chairs in the parlor, and 6 in the kitchen; how many chairs did he put in the two rooms?

21. I paid 3 dollars for a hat, and 6 dollars for a pair of pants; how much money did I spend?

22. Michael bought 8 marbles, and afterwards won 7; how many marbles had he then?

IV.

Add:

1.	1 and 0,	10 and 3,	20 and 5,	30 and 7,	40 and 9.
2.	51 and 2,	61 and 4,	71 and 6,	81 and 9,	91 and 0.
3.	2 and 1,	12 and 1,	22 and 2,	32 and 2,	42 and 3.
4.	53 and 3,	63 and 4,	73 and 4,	83 and 5,	93 and 5.
5.	4 and 6,	14 and 6,	24 and 7,	34 and 7,	44 and 0.
6.	55 and 0,	65 and 8,	75 and 8,	85 and 9,	95 and 9.
7.	6 and 9,	16 and 8,	26 and 7,	36 and 6,	46 and 5.
8.	97 and 0,	87 and 1,	77 and 2,	67 and 3,	57 and 4.
9.	8 and 7,	18 and 3,	28 and 6,	38 and 8,	48 and 4.
10.	69 and 1,	59 and 0,	79 and 9,	89 and 2,	99 and 5.

V.

21+9=?	64+3=?	91+ 9=?	63+ 9=?	92+ 7=?
13+6=?	72+5=?	21+ 8=?	78+ 6=?	86+ 3=?
24+1=?	60+7=?	7+14=?	53+ 9=?	72+ 9=?
42+6=?	34+9=?	93+ 7=?	82+ 6=?	6+12=?
35+9=?	88+4=?	46+ 5=?	9+31=?	7+99=?
74+8=?	62+9=?	13+ 8=?	8+12=?	55+ 2=?
56+6=?	57+8=?	40+ 0=?	90+ 7=?	93+ 9=?
47+7=?	63+5=?	61+ 8=?	68+13=?	27+ 6=?
11+8=?	23+9=?	32+ 1=?	49+ 7=?	7+84=?

VI.

Add:

1. By threes, from 2 to 110.

Thus, 2 and 3 are 5, and 3 are 8, and 3 are 11. &c.

2. By twos, from 3 to 81.
3. By threes, from 1 to 61.
4. By fours, from 3 to 115.
5. By fives, from 2 to 77.
6. By fives, from 4 to 104.
7. By sixes, from 3 to 57.
8. By sixes, from 5 to 83.
9. By sevens, from 4 to 116.
10. By sevens, from 6 to 118.
11. By eights, from 1 to 89.
12. By eights, from 5 to 69.
13. By eights, from 7 to 55.
14. By nines, from 3 to 102.
15. By nines, from 4 to 76.
16. By nines, from 8 to 116.
17. By threes, from 11 to 44.
18. By fives, from 7 to 47.
19. By sevens, from 9 to 86.

VII.

1. A news boy sold 10 papers in the morning and 7 in the afternoon; how many papers did he sell during the day?

2. If Joseph has three cents in one pocket, and 10 cents in another; how many cents has he?

3. William paid 12 cents for a slate and 1 cent for a pencil; what did he pay for both?

4. There are 17 trees in one field and 9 in another; how many trees in the two fields?

5. If there are 15 panes of glass in one window and 8 in another; how many panes in both windows?

6. Francis had 25 cents and his uncle gave him 5 more; how many cents had Francis then?

7. Albert took 14 roses from a bush, and Mary took 9 from the same bush; how many roses were taken from the bush?

8. If John say 64 words in a minute, and Thomas 8, how many words will both say in a minute?

9. Thomas plucked 47 plums from a tree, and picked 9 off the ground; how many plums had Thomas?

10. In a company there are 56 private soldiers, and 6 officers; how many men in the company?

11. How many cents must I pay for a pound of butter worth 36 cents, and a pound of cheese worth 9 cents?

12. Robert having 65 marbles, won 8; how many had he then?

13. There are 19 books on a shelf and 6 on a table; how many books in all?

14. During a recitation 25 questions were answered correctly, and 8 incorrectly; how many questions were asked?

15. Alexander is 36 years old, and Jacob is 9 years older; how old is Jacob?

16. During a game of base-ball, one side made 16 runs, and the other five; how many runs were made by both sides?

17. In the park 45 boys were playing ball, and 7 were playing leap-frog; how many boys were engaged in both games?

18. James paid 4 cents for a kite, and 95 cents for a sled; how much did he spend for both?

19. Frederick rode 5 miles by stage, and 38 miles by railroad; how far did he travel?

20. Bought a penknife for 57 cents, and sold it for 6 cents more than I paid for it; how many cents did I receive?

VIII.

Add:

68	42	57	54	39	24
10	25	30	45	60	75
57	31	68	43	47	18
11	26	31	56	61	86
46	29	79	32	38	38
12	27	42	57	62	87
35	92	81	29	47	59
13	38	43	58	73	98
24	80	72	38	66	62
24	39	44	59	74	99
32	67	19	27	45	54
41	14	93	86	63	75

IX.

Find the sum of

10 and 16	44 and 16	32 and 47	28 and 39	92 and 18
25 and 11	24 and 36	25 and 27	76 and 54	87 and 32
36 and 13	73 and 38	62 and 37	67 and 58	19 and 91
12 and 27	17 and 57	17 and 92	44 and 63	80 and 57
14 and 40	28 and 15	73 and 73	71 and 28	26 and 90
62 and 12	39 and 32	64 and 48	88 and 15	80 and 40
47 and 10	46 and 27	49 and 56	12 and 63	47 and 52
28 and 21	22 and 25	91 and 27	29 and 34	77 and 67
16 and 33	83 and 45	47 and 68	56 and 33	54 and 98
37 and 12	44 and 67	61 and 92	16 and 16	67 and 99

X.

1. William has 54 cents and James has 43; how much money have both?

2. A farmer having 47 ducks, bought 16 more; how many ducks did he have then?

3. How many dollars will pay for a shawl worth 27 dollars, and a dress worth 45 dollars?

4. A butcher killed 25 cows on one day and 38 the next day; how many cows did he kill on both days.

5. A tailor sold 75 yards of cloth on Monday and 62 yards on Tuesday; what was the amount sold?

6. Purchased two tubs of butter, the larger containing 93 pounds, and the smaller, 56 pounds; how much butter did I purchase?

7. A real estate agent sold two lots containing, one, 83 acres, and the other, 44; how many acres did he sell?

8. A man owes 35 dollars for groceries, and 72 dollars for rent; how much does he owe?

9. In a school consisting of two classes, the first class has 42 pupils, and the second 71; how many pupils in the school?

10. Henry is now 16 years of age, how old will he be 36 years hence?

11. Jane's library contains 35 books, and Charles's 25; how many books in both libraries?

12. John received 33 good points for arithmetic one week, and 38 the next; how many good points did he receive?

13. Patrick gave 75 cents for an Advanced Reader, and 55 cents for a small dictionary; how much did he give for both?

14. In a certain class 26 boys have neck-ties, and 17 have none; how many boys in the class?

15. During a monthly competition, one class received 93 credits, and another 78; how many credits were received by both?

16. How much money will be required to purchase a bat worth 65 cents, and a ball worth 80 cents?

17. Andrew bought a pair of skates for 95 cents, and sold them so as to gain 16 cents; what was his selling price?

18. February has 28 days and March 31, how many days in both months?

19. A tailor sold 46 yards of cloth to Mr. Smith, and 39 to Mr. Jones; now many yards of cloth did he sell?

20. Thomas not having written the 25 lines imposed as a task, had them increased by 19; how many lines has he to write?

OPERATION OF ADDITION.

Let it be required to find the sum of 475, 854, and 696.

OPERATION.

475
854
696

2025

SOLUTION.—Having written the numbers so that units of the same order stand in the same column, we begin at the right and add each column separately. The sum of 6 units and 4 units is 10 units; and 10 units and 5 units are 15 units, which are equal to 1 ten and 5 units. We write the 5 units under the column of units, and carry the 1 ten to the column of tens. We next add the column of tens beginning with the 1 ten which we carried from units column. The sum of 1 ten and 9 tens, is 10 tens, and 5 tens are 15 tens, and 7 tens are 22 tens; that is, 2 hundreds and 2 tens. Writing the 2 tens in the column of tens, we carry the 2 hundreds to the column of hundreds. The sum of the hundreds thus increased, 2+6+8+4, is 20 hundreds; that is, 2 thousands and 0 hundreds. As this is the last column we set down the entire sum. The number, 2025 is, therefore, the required sum, because it is the sum of the units, tens, and hundreds of the given numbers.

ILLUSTRATIONS.

(1.)	(2.)	(3.)	(4.)
412	49	418	4734
343	716	36	8062
917	503	672	191
1672	1268	1126	12987

(5.)	(6.)	(7.)
542 feet.	260 days.	278 pounds.
717 "	428 "	402 "
203 "	600 "	736 "
971 "	26 "	877 "
2433 feet.	1314 days.	2293 pounds.

NOTE.—The operation of adding a column of figures should be abbreviated by simply naming the result of each step. Thus, in example 5, the pupil should say 1, 4, 11, 13, (1st. column); 1, 8, 9, 13, (2d column); and 1, 10, 12, 19, 24, (3d column).

WRITTEN EXERCISES.

Add the following:

1. Three hundred ninety; eight hundred thirty-six; three hundred twenty-six; and two hundred nine.

Ans. 1761.

2. Three thousand, forty-eight; one thousand, four hundred eighteen; one thousand, two hundred fifty-two; and one thousand, nine hundred ninety-one.

Ans. 7709.

3. Eight hundred two; two hundred seventy-two; two hundred sixteen; and five hundred thirty-nine.

Ans. 1829.

4. Six hundred ten; one thousand, seven hundred thirty-six; four thousand, eight hundred ninety-seven; seven hundred one; eight hundred thirty-three; and seven hundred ninety-six. *Ans.* 9573.

5. One thousand, two hundred two; five thousand five hundred five; six hundred seventy-eight; two thousand, fifty-one; and one thousand, three hundred thirty-nine. *Ans.* 10775.

6. Two thousand, three hundred sixty-seven; eight hundred seven; five hundred twenty-four; and three thousand, one hundred seventy. *Ans.* 6868.

7. Four thousand, five hundred seventy-eight; nine hundred sixty-one; five hundred seventy-two; and three hundred sixty-three. *Ans.* 6474.

8. One thousand, three hundred nine; four thousand, three hundred twenty-nine; one thousand, two hundred sixty-five; three hundred eight; and four hundred twenty-six. *Ans.* 7637.

9. Eight hundred; four thousand, one hundred

eighty-three; two thousand, one hundred sixty-four; three hundred twenty; and eight hundred five.

Ans. 8272.

II.

10. 176 + 302 + 490. *Ans.* 968.
11. 674 + 523 + 241. *Ans.* 1438.
12. 715 + 672 + 805. *Ans.* 2192.
13. 335 + 856 + 274. *Ans.* 1465.
14. 643 + 129 + 576. *Ans.* 1348.
15. 496 + 257 + 490. *Ans.* 1243.
16. 1045 + 8037 + 6191. *Ans.* 15273.
17. 5434 + 2305 + 1140. *Ans.* 8879.
18. 3287 + 4662 + 9315. *Ans.* 17264.
19. 4906 + 879 + 3402. *Ans.* 9187.
20. 7603 + 46 + 709. *Ans.* 8358.
21. 2004 + 5087 + 603. *Ans.* 7694.

III.

(22.)	(23.)	(24.)	(25.)
3416	7422	6089	6780
8743	8674	7906	3007
2655	9830	4078	5944
14814	25926		

(26.)	(27.)	(28.)	(29.)
96327	37951	56789	99777
86438	98029	37454	66888
69476	96746	15079	55444

(30.)	(31.)	(32.)	(33.)
333355	45706	509234	76815
766988	569897	767448	274867
544375	847687	189979	537967

IV.

34. Three hundred sixty-five thousand, four hundred sixty-two; five hundred sixty thousand, four hundred twenty-seven; four hundred five thousand, seven hundred sixty-three; one hundred thirty-six thousand, one hundred sixty-six. *Ans.* 1467818.

35. Three hundred twenty; four hundred fourteen thousand, five hundred ninety; and eight hundred seventy. *Ans.* 415780.

36. Two thousand, five hundred thirty-seven; nine thousand, three hundred eighty-one; six hundred sixty-eight; nine hundred; and fifty-nine thousand, seven hundred forty-four. *Ans.* 73230.

37. Seven hundred three; one thousand, five hundred ninety; one hundred twenty; eight hundred thousand, sixty-six; and three thousand, seven hundred seventy-seven.

38. Two hundred ten thousand, three hundred eight; twenty-eight thousand, seven hundred fifty-six; three thousand, one hundred forty-two; and thirteen thousand, seven hundred fifty.

39. One hundred nineteen thousand, ninety-four; two hundred three thousand, six hundred four; two hundred fifty-five thousand, two hundred seventeen; three hundred thousand, sixty-five; and sixty-eight thousand, six hundred. *Ans.* 946580.

40. Sixty-four thousand, four hundred sixty-seven; one thousand, five hundred twenty; seven thousand, nine hundred thirty-six; thirteen thousand, seven hundred forty-four; nine thousand, nine hundred fifty-five; and eleven thousand, eight hundred twenty-two.

V.

(42.)	(43.)	(44.)	(45.)	(46.)	(47.)	(48.)	(49.)	(50.)
37	78	68	68	79	51	70	39	21
12	35	30	32	68	29	68	12	32
14	92	34	93	31	36	92	77	49
29	71	79	45	72	14	55	85	98
62	57	57	12	19	72	41	56	87

(51.)	(52.)	(53.)	(54.)	(55.)	(56.)	(57.)	(58.)
91	14	93	63	38	36	87	79
65	17	12	47	48	72	36	63
42	36	49	93	72	46	45	45
39	48	67	25	96	35	32	33
11	57	82	12	57	20	24	29
13	36	91	49	43	93	92	64

(59.)	(60.)	(61.)	(62.)	(63.)	(64.)
231	896	729	302	429	365
462	431	820	921	602	893
563	567	926	426	391	943
492	624	409	526	402	627

(65.)	(66.)	(67.)	(68.)	(69.)
893	321	482	803	234
491	402	371	413	964
682	913	206	516	757
963	806	431	796	813
421	201	502	385	405
506	497	739	402	691

(70.)	(71.)	(72.)	(73.)	(74.)
205	910	749	102	482
431	796	322	893	396
304	804	416	421	410
276	510	702	605	516
153	312	512	734	503
421	406	614	896	512
689	527	735	431	431

(75.)	(76.)	(77.)	(78.)
4321	6893	5002	7893
5678	405	3015	4821
3134	7931	6912	5632
5063	3144	7896	345
2093	5689	4004	21
7245	3965	7965	4002
2653	201	4689	3112
203	6009	398	705
5035	3965	4590	3456

UNITED STATES CURRENCY.

41. The ***Sign***,**$**, written before a number signifies *dollars*. Thus, the expression $120 is read *one hundred twenty dollars*.

42. *Dollars* and *cents* may be written together, the *cents* being separated from the *dollars* by a point. Thus, the expression $25.35 is read 25 *dollars* and 35 *cents*.

Express by proper signs and figures, the following

EXERCISES.

1. Seven dollars and twenty-four cents.
2. Sixteen dollars and forty cents.
3. Forty-seven dollars and sixty-three cents.
4. Ninety-nine dollars and fourteen cents.
5. Eighty-seven cents.
6. Seventy-five cents.
7. Eleven dollars and eleven cents.
8. Fifty dollars and twenty-five cents.
9. Nineteen dollars and three cents.
10. Fifty cents. Eighty-five cents.
11. Three dollars and fifty cents.
12. Sixty-two dollars and nine cents.
13. Thirty-seven cents.
14. Sixty-two cents.
15. Thirty-three dollars and one cent.
16. Seventy dollars and ten cents.
17. Four cents. Eight cents.
18. Thirty-three cents. Five cents.
19. One hundred dollars and three cents.

43. In writing dollars and cents for the purpose of adding them, the separating points must stand in the same column.

1. What is the sum of \$10.27, \$123.06, \$206.90, \$3.10, and \$0.46?

OPERATION.

\$10.27
123.06
206.90
3.10
0.46

\$343.79

SOLUTION.—Having arranged the numbers according to Art. 43, we add them by the principles of simple addition. The separating point is placed in the result immediately under those of the given numbers.

In like manner add the following:

(2.)	(3.)	(4.)
$81.05	$217.75	$78.50
54.62	83.16	151.63
125.84	55.32	96.18
370.62	135.67	12.03
$632.13		

(5.)	(6.)	(7.)
$65.14	$75.15	$2245.76
91.73	207.45	791.18
182.64	1241.16	33.87
79.30	79.67	6.75
20.37	34.81	650.37
	$1638.24	

(8.)	(9.)	(10.)
$5838.24	$1846.25	$37608.75
6183.42	30000.00	6000.00
981.34	4706.50	3337.25
89.65	373.33	840.16
326.10	876.45	73.82
4823.63	1950.55	10950.63
		$58810.61

11. Find the sum of $75.85; $16.05; $123.25; $475.00; $325.50; $110.16.

12. Find the sum of $3284.63; $87.24; $1325.55; $1806.10

13. Add $26.45; $33.80; $70.67; $8.70; and $63.73.

14. Add $135.10; $0.17; $1.67; $1800.00; $3.60; and $867.25.

15. A grocer bought sugar for $19.27; coffee for $8.35; tea for $16.75; butter for $17.16; cheese for $5.70; and eggs for $4.75. What was the amount of his purchases? *Ans.* $71.98.

16. A, owes $137.75 to B; $297.25 to C; $960.00 to D; and $500.50 to E; what is his indebtedness?

17. A lady purchased a dress for $27.60; a shawl for $14.75; a bonnet for $6.50; a pair of gloves for $1.75; and 6 handkerchiefs for 90 cents; how much money did she expend? *Ans.* $51.50

18. Mr. Owens bought a house for $3816.00; paid $175.75 for repairing it, and $200.75 for painting it; then sold it at a profit of $575.50; what was his selling price? *Ans.* $4768.

19. A merchant imported goods to the amount of $3827.50; paid duties $650.75; and freight $127.50; what was the entire cost of the goods?

20. A farmer made the following sales: wheat, $687.00; potatoes, $67.00; corn, $180.75; cabbage, $16.80; turnips, $20.60; apples, $76.05; pears and peaches, $99.18; what was the amount of the sales?

21. How much will a pupil pay for the following set of school-books: Intermeditate Reader, 45 cents; Grammar, 36 cents; Arithmetic, 40 cents; Catechism, 12 cents; Geography, 70 cents; and a U. S. History, 25 cents? *Ans.* $2.28

22. In a family of five persons, the father earns $12.50 per week; the mother, $6.75; the daughter, $3.25; one of the sons, $10.00; and the other son, $4.65; what are the weekly wages of the family?

WRITTEN EXERCISES.

(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)
78	24	18	92	79	83	40	82
92	68	75	35	47	20	55	41
31	52	69	24	93	88	61	89
46	37	37	11	45	93	72	20
39	21	12	13	60	23	45	78
—	—	—	—	—	—	—	—

(9.)	(10.)	(11.)	(12.)	(13.)	(14.)	(15.)	(16.)
27	53	30	84	46	79	92	13
82	46	87	47	13	20	15	93
50	92	12	39	64	18	26	22
99	38	56	90	21	32	98	69
13	84	73	35	37	47	72	18
67	75	69	21	48	53	45	22
48	90	58	19	59	61	82	87
—	—	—	—	—	—	—	—

(17.)	(18.)	(19.)	(20.)	(21.)	(22.)
214	182	831	231	507	792
931	903	477	894	931	406
653	756	922	510	496	317
892	193	462	714	572	508
701	411	509	872	831	704
—	—	—	—	—	—

(23.)	(24.)	(25.)	(26.)	(27.)	(28.)
472	837	943	632	956	396
103	502	201	709	382	408
419	901	384	243	405	191
692	368	572	571	172	782
785	417	709	832	293	401
603	596	819	431	184	756
411	632	345	709	279	835
—	—	—	—	—	—

(29.)	(30.)	(31.)	(32.)	(33.)
8912	3965	1045	7432	1009
7056	2138	3923	5631	4982
2398	4760	7864	8476	3875
1702	9023	5231	9401	4623
4109	8197	2109	7198	9742

(34.)	(35.)	(36.)	(37.)	(38.)
9132	4562	6486	2345	9784
4216	3954	2447	2981	4956
5842	1894	5819	7108	3927
7720	9467	1234	5643	5273
8654	5974	9768	2731	1459
9328	3192	3521	1852	2186
1217	1804	7923	2946	1355
5689	5287	4210	1598	9761

(39.)	(40.)	(41.)	(42.)
65781	38393	20301	89329
94975	97684	89734	72013
70897	37469	50632	40965
84518	54567	39217	81708
39572	92841	40982	34562
64784	91950	56721	93149
43062	86372	24002	99825
14849	59841	96831	42623
39047	61136	44765	18764
28634	90410	51384	56348

SUBTRACTION.

——:o:——

43. ***Subtraction*** is the process of finding the difference between two numbers.

SUBTRACTION TABLE.

0 from any number leaves that number; thus, 0 from 1 leaves 1; 0 from 2 leaves 2, etc.

1 from	2 from	3 from
1 leaves 0	2 leave 0	3 leave 0
2 leaves 1	3 leave 1	4 leave 1
3 leaves 2	4 leave 2	5 leave 2
4 leaves 3	5 leave 3	6 leave 3
5 leaves 4	6 leave 4	7 leave 4
6 leaves 5	7 leave 5	8 leave 5
7 leaves 6	8 leave 6	9 leave 6
8 leaves 7	9 leave 7	10 leave 7
9 leaves 8	10 leave 8	11 leave 8
10 leaves 9	11 leave 9	12 leave 9

4 from	5 from	6 from
4 leave 0	5 leave 0	6 leave 0
5 leave 1	6 leave 1	7 leave 1
6 leave 2	7 leave 2	8 leave 2
7 leave 3	8 leave 3	9 leave 3
8 leave 4	9 leave 4	10 leave 4
9 leave 5	10 leave 5	11 leave 5
10 leave 6	11 leave 6	12 leave 6
11 leave 7	12 leave 7	13 leave 7
12 leave 8	13 leave 8	14 leave 8
13 leave 9	14 leave 9	15 leave 9

7 from	8 from	9 from
7 leave 0	8 leave 0	9 leave 0
8 leave 1	9 leave 1	10 leave 1
9 leave 2	10 leave 2	11 leave 2
10 leave 3	11 leave 3	12 leave 3
11 leave 4	12 leave 4	13 leave 4
12 leave 5	13 leave 5	14 leave 5
13 leave 6	14 leave 6	15 leave 6
14 leave 7	15 leave 7	16 leave 7
15 leave 8	16 leave 8	17 leave 8
16 leave 9	17 leave 9	18 leave 9

ORAL EXERCISES.

I.

What remains after taking

6 from 7 ?	1 from 8 ?	1 from 9 ?	4 from 7 ?	5 from 5 ?
3 from 8 ?	1 from 1 ?	0 from 3 ?	2 from 2 ?	1 from 4 ?
0 from 1 ?	5 from 7 ?	2 from 6 ?	3 from 7 ?	3 from 8 ?
4 from 9 ?	4 from 5 ?	7 from 9 ?	1 from 6 ?	8 from 9 ?
1 from 2 ?	2 from 4 ?	8 from 8 ?	0 from 7 ?	2 from 7 ?
0 from 8 ?	2 from 8 ?	6 from 9 ?	7 from 8 ?	5 from 8 ?
7 from 7 ?	3 from 6 ?	1 from 7 ?	2 from 5 ?	3 from 4 ?
4 from 6 ?	1 from 5 ?	0 from 9 ?	3 from 5 ?	4 from 8 ?
2 from 3 ?	9 from 9 ?	5 from 6 ?	5 from 9 ?	6 from 6 ?
3 from 9 ?	0 from 2 ?	0 from 0 ?	0 from 6 ?	2 from 9 ?

II.

15—7= ?	15—8= ?	17—8= ?	18—8= ?	15—3= ?
10—8= ?	11—2= ?	14—7= ?	13—9= ?	12—9= ?
12—3= ?	17—9= ?	11—6= ?	12—8= ?	11—1= ?
13—6= ?	13—5= ?	10—2= ?	14—2= ?	18—3= ?
10—9= ?	10—6= ?	16—7= ?	16—6= ?	11—3= ?
14—6= ?	12—5= ?	14—8= ?	14—3= ?	18—7= ?
12—7= ?	16—9= ?	12—8= ?	17—6= ?	14—4= ?
13—4= ?	11—8= ?	18—5= ?	16—2= ?	13—2= ?
11—0= ?	15—9= ?	16—4= ?	17—9= ?	15—4= ?
13—9= ?	10—1= ?	17—5= ?	18—4= ?	16—8= ?

III.

6+7—3=?	14+4—9=?	6—4+ 1=?	10—(3+5)=?
8+4—5=?	16+2—7=?	16—3+ 7=?	18—(7—2)=?
9+2—6=?	13+3—1=?	14—9+ 3=?	9—(4+3)=?
7+7—5=?	12+5—4=?	9—8+ 6=?	15—(6—1)=?
8+6—3=?	15+0—8=?	11—3+ 9=?	13—(7+2)=?
9+8—6=?	9+9—6=?	7—4+ 6=?	14—(5+4)=?
5+4—2=?	16+1—7=?	15—5+18=?	16—? = 9
8+8—9=?	11+3—5=?	16—9+10=?	10—? = 6
3+9—1=?	10+4—8=?	14—4+ 3=?	13—? = 7
7+9—6=?	12+4—9=?	9—6+12=?	18—? =11

IV.

1. Subtract 5 from 6; 16; 26; 36; 46; 56; 66; 76; 86; 96.
2. Subtract 4 from 14; 44; 24; 94; 84; 64; 54; 34; 74.
3. Subtract 7 from13; 33; 23; 43; 14; 24; 64; 74.
4. Subtract 9 from 18; 28; 78; 97; 67; 15; 75; 85; 12; 62; 42.
5. Subtract by threes from 29 to 2.
6. Subtract by sixes from 45 to 3.
7. Subtract by eights from 79 to 15.
8. Subtract by twos from 63 to 1.
9. Count by fives from 6 to 46 and back again.
10. Count by sevens from 9 to 72 and back again.
11. Subtract by 9's from 100 to 1
12. Subtract by 4's from 83 to 7.

V.

1. Margaret bought 7 cakes, and eat 4; how many had she remaining?

SOLUTION.—If Margaret bought 7 cakes and eat 4 of them, she must have remaining the difference between 7 cakes and 4 cakes, which is 3 cakes. Therefore, if Margaret bought 7 cakes and eat 4 of them, she has 3 cakes remaining.

2. George picked 6 quarts of strawberries and William 4; how many more quarts did George pick than William?

3. A boy had 9 cents and spent 3 for fire-crackers; how many cents had he left?

4. Albert caught 7 butterflies, but 2 got away; how many had he then?

5. Jane bought 5 oranges and gave away 2; how many had she for herself?

6. Henry sold for 7 cents a kite that cost him 5 cents; how many cents did he gain?

7. Charles rises at 6 o'clock and studies till 8; how many hours does he employ in study?

8. You have 8 fingers on both hands. Close 3 and tell me how many remain open.

9. If I borrow $12 and pay back $5, how much do I still owe?

10. A boy had 16 rabbits, 7 of which were killed by a dog. How many rabbits has he left?

11. Mr. Brown purchased $6 worth of provisions, and gave the clerk a $10 bill; how much change did he receive?

12. In a class of 25 boys, 9 were detained for bad conduct; how many were dismissed?

13. A boat containing 23 persons capsized, and 8 were drowned; how many were saved?

14. How many days from the 4th to the 27th of July?

15. I bought a harness worth $22, and paid $5 on it; how much do I still owe?

16. In a company of soldiers there were 78 men. Of these 5 were killed, and 4 wounded; how many were fit for duty?

17. Abel is 8 years of age. How many years will pass before he is 55 years?

18. A school contained 9 more girls than boys. There were 67 girls; how many boys?

19. A farmer raised 38 tons of hay and sold 6 of them; how many tons remain?

20. There were 16 persons in an omnibus. After 5 got out, and 3 got in, how many persons were then in the "bus"?

21. In a ring there were 19 marbles. James shot away 6, and Edward 2; how many remained in the ring?

22. Richard had 27 marbles. He won 16 and lost 7; how many had he then?

23. William had 1 cent and his uncle gave him 8 more. How much does he still want to purchase a pair of skates worth 79 cents?

24. There were 86 peaches on a tree. The wind blew off 5; how many peaches remained on the tree?

25. An arithmetic is worth 70 cents, and a slate is worth 8 cents. What is the difference of their prices?

26. James had 17 oranges. He gave 4 to Mary, 5 to Esther, and sold the rest; how many did he sell?

27. Oliver had 15 lines to write from his history. He wrote 4 on Monday, and the same number on Tuesday; how many had he still to write?

28. James is 14 years old, Emma 4 years older, and Jessie 7 years younger than Emma; how old are Emma and Jessie?

29. 18 boys were going to have a swim; 3 stopped to hear a hand organ, and 5 ran to a fire. How many went to swim?

30. What is the difference between 16+11 and 2+8?

VI.

From 26 take 15	From 87 take 36	From 84 take 69
From 47 take 21	From 43 take 29	From 56 take 27
From 69 take 36	From 62 take 47	From 97 take 89
From 74 take 23	From 39 take 29	From 42 take 26
From 63 take 31	From 28 take 19	From 22 take 18
From 15 take 11	From 55 take 46	From 31 take 29
From 37 take 16	From 37 take 35	From 64 take 17
From 99 take 63	From 46 take 38	From 91 take 36
From 86 take 74	From 73 take 66	From 72 take 49
From 28 take 21	From 92 take 78	From 88 take 67
From 74 take 35	From 54 take 48	From 69 take 58
From 27 take 19	From 38 take 36	From 90 take 26
From 83 take 57	From 70 take 16	From 81 take 37

VII.

1. Martin had 25 cents, and spent 15 cents for a lunch; how many cents had he left?

2. From a flock of 87 sheep a farmer sold 26; how many had he remaining?

3. Purchased a watch for $47, and sold it for $34. How much did I lose?

4. Luke is 17 years old, and his father 58 years old. What is the difference of their ages?

5. A geography is worth 70 cents, and a small grammar 36 cents; how much more is the geography worth than the grammar?

6. In the last examination James had 75 per cent. and Henry 38 per cent. What per cent. had James more than Henry?

7. A person spent 37 cents in a store. What change did he receive if he gave a 50 cent piece?

8. Joseph ran 84 rods and William 56; how much farther did Joseph run than William?

9. The sum of two numbers is 75, and one of them is 25. What is the other?

11. A man sold a horse for $87, which was $18 more than it cost; what was the cost price?

12. John has 63 cents. If he spend 4 cents for marbles. 25 cents for a ball, and 5 cents for peanuts, how many cents will he have left?

13. A tree 58 feet high was broken off 46 ft. from the top. How high is the remaining piece?

14. A foreman receives $80 a month. He pays $6 for a ton of coal, $20 for provisions, $3 for a pair of shoes, and $14 for sundry affairs; how much has he remaining?

15. A lady went shopping with one $5 bill and two $10 bills. She spent $3 for ribbons, $6 for velvet, $7 for silk, and $2 for lining. How many dollars had she remaining?

16. A farmer having 64 sheep, sold 17 of them to A, 36 to B, and the remainder to C. How many did C receive?

17. 16 pupils were promoted from a class of 75; and on the same day 11 were received into the class; how many pupils were then in the class?

18. John had 26 cents, and his mother gave him 32. He then lost 17; how many cents had he left?

19. Sold a sled worth 87 cents for a penknife and 15 cents; what was the penknife worth?

20. Mr. White had $93 in bank. He took out $37 on Monday; and put in $26 the same afternoon. On Tuesday he took out $16; how much has he now in bank?

VIII.

1. To 5 add 7; subtract 6; add 4; subtract 9; add 11; subtract 3; add 4; add 12; subtract 15; add 2; what is the result?

2. 7—2+5—1+9—6+12+1—5+20—37=?
3. 6+17—11+37—6+2+5—25+7—30=?
4. 18—12+4—10+1—1+6—3+7=?
5. 3+7—4+5—1+10—6+2—8+1—3—6=?
6. 3—2+9—8+6+4—2+10—6—8+4=?
7. 17+8—6+10—8—3+7+4—6=?
8. 47—7+10—25+5—6—4+3—13—7+4+2=?
9. 38—1+3—30+17+3—16+2—7+1—4=?
10. 67—8+1—50+47—6+7—8+32—2+8=?
11. 46—26+17+7—8+3—16+2=?
12. 18+7—5+32—6+7—2—8+16—7+23=?

OPERATION OF SUBTRACTION.

1. Let it be required to find the difference between 837 and 564.

OPERATION.

Minuend, 837
Subtrahend, 564
Remainder, 273

SOLUTION.—We write the subtrahend under the minuend so that units of the same order shall stand in the same column. Beginning at the right, we see that 4 units from 7 units leave 3 units, which we write in the line below. Since 6 tens cannot be taken from 3 tens, we add 1 hundred, or 10 tens to the 3 tens, making 13 tens. Now, 6 tens from 13 tens leave 7 tens; which we write under the tens. To compensate for the 10 tens, or 1 hundred added to the minuend, we diminish the 8 hundreds by 1 hundred. Then 5 hundreds taken from 7 hundreds, leave 2 hundreds, which is written under hundreds.

The number 273 is, therefore, the difference between the two given numbers.; because it is the sum of the several remainders, obtained by subtracting the parts of the subtrahend from the corresponding parts of the minuend. (Principle III.)

ILLUSTRATIONS.

From 5736	587 673 yds.	$5820.54
take 3428	93 736 yds.	2074.18
Remainder, 2308	493 937 yds.	3746.36
Proof, 5736	587 673 yds.	$5820.54

WRITTEN EXERCISES

1.	634—231.	*Ans.* 403.
2.	748—523.	*Ans.* 225.
3.	542—132.	*Ans.* 410.
4.	527—221.	*Ans.* 306.
5.	876—525.	*Ans.* 351.

6.	895—371.	*Ans.* 524.
7.	178—153.	*Ans.* 25.
8.	387—152.	*Ans.* 235.
9.	396—312.	*Ans.* 84.
10.	297—174.	*Ans.* 123.
11.	952—834.	*Ans.* 118.
12.	733—214.	*Ans.* 519.
13.	487—329.	*Ans.* 158.
14.	877—593.	*Ans.* 284.
15.	736—682.	*Ans.* 54.
16.	757—378.	*Ans.* 379.
17.	785—597.	*Ans.* 188.
18.	476—289.	*Ans.* 187.
19.	894—698.	*Ans.* 196.
20.	943—764.	*Ans.* 179.
21.	587—364.	*Ans.* 223.
22.	829—74.	*Ans.* 755.
23.	700—309.	*Ans.* 391.
24.	186—98.	*Ans.* 88.
25.	200—45.	*Ans.* 155.
26.	9084—5579.	*Ans.* 3505.
27.	6240—4089.	*Ans.* 2151.
28.	5089—3009.	*Ans.* 2080.
29.	9001—2532.	*Ans.* 6469.
30.	7689—2147.	*Ans.* 5542.
31.	7224—973.	*Ans.* 6251.
32.	1096—982.	*Ans.* 114.
33.	4232—109.	*Ans.* 4123.
34.	8624—4007.	*Ans.* 4617.
35.	7586—397.	*Ans.* 7189.
36.	3120—895.	*Ans.* 2225.
37.	6000—3006.	*Ans.* 2994.

38.	2364—1008.	*Ans.* 1356.
39.	5307—48.	*Ans.* 5259.
40.	4800—376.	*Ans.* 4424.
41.	9854—7926.	*Ans.* 1928.
42.	44699—9886.	*Ans.* 34813.
43.	67888—8096.	*Ans.* 59792.
44.	22003—10008.	*Ans.* 11995.
45.	48909—19898.	*Ans.* 29011.
46.	71968—50003.	*Ans.* 21965.
47.	70000—69999.	*Ans.* 1.
48.	66901—8909.	*Ans.* 57992.
49.	91111—8908.	*Ans.* 82203.
50.	16843—13959.	*Ans.* 2884.
51.	57345—22198.	*Ans.* 35147.
52.	35123—11207.	*Ans.* 23916.
53.	82036—4804.	*Ans.* 77232.
54.	21185—5706.	*Ans.* 15479.
55.	58900—46304.	*Ans.* 12596.
56.	353655—9447.	*Ans.* 344208.
57.	478547—98215.	*Ans.* 380332.
58.	847654—398007.	*Ans.* 449647.
59.	504245—102907.	*Ans.* 401338.
60.	642006—97719.	*Ans.* 544287.
61.	703901—65809.	*Ans.* 638092.
62.	644305—509709.	*Ans.* 134596.
63.	458724—417384.	*Ans.* 41340.
64.	698447—525809.	*Ans.* 172638.
65.	500702—309908.	*Ans.* 190794.
66.	201006—109207.	*Ans.* 91799.
67.	376210—265100.	*Ans.* 111110.
68.	709558—636900.	*Ans.* 72658.
69.	369636—84907.	*Ans.* 284729.

UNITED STATES CURRENCY.

To subtract *dollars* and *cents* write them as in addition, so that the separating points may fall in the same column. Thus, to subtract \$17.67 from \$26.03, we place the less number under the greater, taking care to have the points in the same column, and then proceed as in ordinary subtraction.

ILLUSTRATION.

Minuend, \$26.03
Subtrahend, 17.67

Remainder, \$ 8.36.

	(1.)	(2.)	(3.)	(4.)
From	\$39.62	\$186.25	\$170.00	\$2084.62
take	14.37	49.75	37.33	1950.37
	\$25.25	\$136.50	\$132.67	\$134.25

(5.)	(6.)	(7.)	(8.)
\$2500.00	\$360.01	\$8100.75	\$10760.00
1750.20	73.09	998.63	8700.75

9. Purchased a house for \$16787.99 and sold it for \$18000.00; what was my gain? *Ans.* \$1212.01.

10. A tailor purchased cloth to the amount of \$63.25 and afterwards sold it for \$59.16; what was his loss? *Ans.* \$4.09.

11. A and B began business with a capital of \$16000.00. If A put in \$9713.73, what was B's share of the capital? *Ans.* \$6286.27.

12. A gentleman having \$3800.25 in bank, drew out \$468.71; how much has he remaining in bank? *Ans.* \$3331.54

13. A lady buys a barrel of flour for $7.25, and hands the seller a $10 bill; how much change should she receive? *Ans.* $2.75.

14. A mechanic earned $37.48, but received only $26.85; how much is still due him? *Ans.* $10.63.

15. A merchant in one day sold goods to the amount of $3615.70, and thereby gained $963.80. What was his buying price? *Ans.* $2651.90

16. How much must be added to $675.38 to make it $1000? *Ans.* $324.62.

17. A man with $10000 cash invests in the dry goods business, paying $5673.75 for the store and $2987 for the goods. How much cash has he left? *Ans.* $1339.25.

18. If a man receive $150.00 per month, and pay $32 for provisions, $16.75 for clothing, $30 for rent, and $19.67 for sundry articles, how much will he be able to save each month? *Ans.* $51.58.

19. A farmer sold hay for $16.15, vegetables for $16.75, and a calf for $18.50. He received in payment butter worth $6.10, flour worth $7.65, and the remainder in cash. How much cash did he receive? *Ans.* $37.65.

20. An auctioneer received furniture to the value of $7864, which he auctioned off in two lots, one for $4620.75, and the other for $3000; what was the loss on the furniture? *Ans.* $243.25.

21. I bought a pair of horses for $620, a harness for $60.50, and a carriage for $300 less than I paid for both horses and harness; what was the cost of the carriage?

WRITTEN EXERCISES

(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)
93	47	82	51	67	89	21	50
86	32	70	49	52	28	19	42

(9.)	(10.)	(11.)	(12.)	(13.)	(14.)
946	423	482	703	681	732
817	296	379	486	397	489

(15.)	(16.)	(17.)	(18.)	(19.)
3841	4928	9238	7678	8728
1974	2396	5373	6723	5921

(20.)	(21.)	(22.)	(23.)
47206	80129	79345	20001
39135	36547	45678	19245

(24.)	(25.)	(26.)	(27.)
8965	34527	57932	49345
492	10968	9682	30921

(28.)	(29.)	(30.)	(31.)
72145	30924	70093	64983
9062	8921	19027	35897

32.	493—387.	*Ans.* 106
33.	4061—289.	*Ans.* 3772
34.	537—29.	*Ans.* 508
35.	601—482.	*Ans.* 119
36.	3971—896.	*Ans.* 3075
37.	4008—3196.	*Ans.* 812
38.	2134—97.	
39.	493—281.	
40.	175—26.	
41.	832—746.	
42.	201—156.	
43.	824—357.	
44.	923—868.	
45.	1002—491.	
46.	796—485.	
47.	371—296.	
48.	4321—3924	
49.	862—674.	
50.	502—209.	
51.	738— 21.	
52.	892—406.	
53.	56892—7964.	
54.	5394—4096.	
55.	792—485.	
56.	6931—5076.	
57.	392—289.	
58.	702—498.	
59.	2020—1965.	
60.	70065—3962.	
61.	8434—7908.	
62.	456—.390	

MULTIPLICATION.

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44. ***Multiplication*** is the process of taking one number as many times as there are units in another.

Multiplication Table.

Once 0 is 0; twice 0 is 0; 0 taken any number of times is 0. 0 times 1 is 0; 0 times 2 is 0; 0 times any number is 0.

Once	Twice	3 times	4 times
1 is 1	1 is 2	1 is 3	1 is 4
2 are 2	2 are 4	2 are 6	2 are 8
3 are 3	3 are 6	3 are 9	3 are 12
4 are 4	4 are 8	4 are 12	4 are 16
5 are 5	5 are 10	5 are 15	5 are 20
6 are 6	6 are 12	6 are 18	6 are 24
7 are 7	7 are 14	7 are 21	7 are 28
8 are 8	8 are 16	8 are 24	8 are 32
9 are 9	9 are 18	9 are 27	9 are 36
10 are 10	10 are 20	10 are 30	10 are 40
11 are 11	11 are 22	11 are 33	11 are 44
12 are 12	12 are 24	12 are 36	12 are 48

5 times	6 times	7 times	8 times
1 is 5	1 is 6	1 is 7	1 is 8
2 are 10	2 are 12	2 are 14	2 are 16
3 are 15	3 are 18	3 are 21	3 are 24
4 are 20	4 are 24	4 are 28	4 are 32
5 are 25	5 are 30	5 are 35	5 are 40
6 are 30	6 are 36	6 are 42	6 are 48
7 are 35	7 are 42	7 are 49	7 are 56
8 are 40	8 are 48	8 are 56	8 are 64
9 are 45	9 are 54	9 are 63	9 are 72
10 are 50	10 are 60	10 are 70	10 are 80
11 are 55	11 are 66	11 are 77	11 are 88
12 are 60	12 are 72	12 are 84	12 are 96

9 times	10 times	11 times	12 times
1 is 9	1 is 10	1 is 11	1 is 12
2 are 18	2 are 20	2 are 22	2 are 24
3 are 27	3 are 30	3 are 33	3 are 36
4 are 36	4 are 40	4 are 44	4 are 48
5 are 45	5 are 50	5 are 55	5 are 60
6 are 54	6 are 60	6 are 66	6 are 72
7 are 63	7 are 70	7 are 77	7 are 84
8 are 72	8 are 80	8 are 88	8 are 96
9 are 81	9 are 90	9 are 99	9 are 108
10 are 90	10 are 100	10 are 110	10 are 120
11 are 99	11 are 110	11 are 121	11 are 132
12 are 108	12 are 120	12 are 132	12 are 144

ORAL EXERCISES.

I.

How many are

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

II.

13 × 4 = ?	16 × 5 = ?	11 × 10 = ?	18 × 2 = ?
15 × 2 = ?	12 × 11 = ?	10 × 10 = ?	11 × 7 = ?
12 × 7 = ?	18 × 6 = ?	18 × 9 = ?	16 × 7 = ?
14 × 3 = ?	17 × 3 = ?	14 × 7 = ?	14 × 5 = ?
11 × 11 = ?	14 × 8 = ?	17 × 8 = ?	12 × 6 = ?
10 × 4 = ?	12 × 10 = ?	15 × 4 = ?	17 × 9 = ?
15 × 6 = ?	15 × 9 = ?	12 × 12 = ?	10 × 2 = ?
17 × 5 = ?	18 × 4 = ?	13 × 6 = ?	15 × 8 = ?
12 × 9 = ?	16 × 8 = ?	16 × 3 = ?	13 × 5 = ?
13 × 7 = ?	13 × 9 = ?	14 × 2 = ?	18 × 7 = ?

III.

$6\times9+2=?$	$8\times9+24=?$	$(6+7)\times3=?$
$8\times7+9=?$	$16\times5-18=?$	$(14-3)\times6=?$
$7\times9+17=?$	$14\times6+60=?$	$(16-4)\times9=?$
$12\times11+8=?$	$9\times5-15=?$	$(11-6)\times7=?$
$15\times6+9=?$	$17\times4-15=?$	$(20-2)\times5=?$
$8\times6-4=?$	$15\times61+0=?$	$(13\times1)\times4=?$
$12\times9-18=?$	$18\times8-51=?$	$(6+2)\times11=?$
$7\times6-2=?$	$8\times4-30=?$	$(1+9)\times5=?$
$13\times8-12=?$	$7\times12+3=?$	$(28-15)\times2=?$
$11\times11-11=?$	$7\times7+11=?$	$(21-6)+5=?$
$30-6\times4=?$	$62-12\times4=?$	$78-16\times4=?$
$19+11\times11=?$	$28+6\times16=?$	$13+13\times4=?$
$37-9\times4=?$	$31+9\times8=?$	$99-17+5=?$

IV.

Multiply 21 by 9; 31 by 8; 41 by 7; 5 by 6; 61 by 5; 72 by 4; 82 by 3; 92 by 3.

Multiply 83 by 2; 73 by 3; 22 by 8; 32 by 7; 60 by 4; 53 by 5; 43 by 6; 94 by 9.

Multiply 65 by 3; 34 by 6; 20 by 7; 44 by 5; 75 by 2; 54 by 4; 84 by 9; 90 by 8.

Multiply 56 by 3; 25 by 6; 36 by 5; 66 by 2; 87 by 8; 40 by 4; 76 by 9; 97 by 7.

Multiply 37 by 4; 58 by 2; 47 by 3; 98 by 6; 89 by 7; 27 by 5; 68 by 9; 99 by 8.

V.

1. What will 3 pounds of raisins cost at 11 cents a pound?

SOLUTION.—If 1 pound of raisins cost 11 cents, 3 pounds will cost 3 times as much as 1 pound, or 3 times 11 cents, which are 33 cents. Therefore, if 1 pound of raisins cost 11 cents, 3 pounds will cost 33 cents.

2. What cost 2 spools of thread at 5 cents apiece?

3. In one gallon there are 4 quarts; how many quarts in 7 gallons? 9 gallons? 20 gallons?

4. There are 7 days in a week; how many days in 9 weeks? 5 weeks? 3 weeks? 13 weeks? 15 weeks?

5. What will 6 pounds of cheese cost at 9 cents a pound?

6. If you solve 8 problems a day, how many will you solve in 5 days? 7 days? 3 days? 2 days?

7. At 12 cents a piece what will 8 primers cost?

8. James earns $6 a week and Henry $3; how much will both earn in 3 weeks? 9 weeks? 13 weeks?

9. How many inches in 9 feet, each foot containing 12 inches?

10. What will 13 tons of coal cost at $7 a ton? at $6? at $8? at $5?

11. John bought 6 rubber balls at 16 cents each. How much change should he receive from a dollar?

12. A man travelled by stage at the rate of 8 miles an hour. How far did he travel in 9 hours? 11 hours? 16 hours? 18 hours?

13. I bought 3 pounds of beef at 18 cents a pound, and 11 pounds of rice at 11 cents a pound; what did both cost?

14. What will be the cost of 7 pounds of coffee at

17 cents a pound, and 1 pound of tea at 75 cents a pound?

15. Two persons travel in the same direction, one 38 miles a day and the other 24; how far apart are they at the end of 6 days? 2 days? 9 days?

16. A tailor bought 15 yards of cloth at $5 a yard; but it being damaged he was obliged to sell it at a loss of $13. How much did he receive for it?

17. Joseph has 11 chestnuts, and Henry 3 times as many less 16; how many has Henry?

18. Two men start from the same point and travel in opposite directions, one 34 miles a day, and the other 26; how far apart are they in 5 days?

19. How many handkerchiefs in 8 boxes, each containing 25 of them?

20. Two men travelled toward each other, one 4 miles an hour, and the other 3. They had been travelling 22 hours before they met; how far apart were they?

21. What cost 4 base balls at 75 cents apiece?

22. What cost 2 pairs of gloves at 67 cents a pair?

23. A boy earned 67 cents a day and paid 47 of it for board; how much had he at the end of 6 days?

24. Bought 9 loads of wheat at $30 a load, and sold it for $300; how much did I gain?

25. A carpenter earned $18 a week, and a shoemaker $11. How much more than the shoemaker will the carpenter have earned in 16 weeks?

26. If a man dig 27 bushels of potatoes in one day, how many will he dig in 6 days? 7 days? 3 days?

27. What is the amount of the following bill: 6 quarts of soft-soap at 11 cents a quart; 7 cakes of soap at 9 cents each; and 2 brooms at 35 cents a piece?

28. If 7 men do a piece of work in 19 days, how long will it take one man to do it?

29. How many pounds of coffee in 4 bags, each containing 46 pounds? 37 pounds? 50 pounds?

30. If 12 men build a wall in 12 days, how long will it take one man to build it?

31. There are 16 ounces in one pound; how many ounces in 5 pounds? 9 pounds? 3 pounds? 2 pounds?

32. If 14 yards be required to make one suit of clothes, how many yards will 5 suits require? 3 suits? 7 suits?

33. If a pound of butter cost 23 cents, what will 9 pounds cost?

34. A farmer sold 16 bushels of potatoes to one man, 20 to another, and 32 to a third, at $2 per bushel; how much did he receive?

35. William is 15 years old and his uncle Charles is 4 times as old; what is the sum of their ages?

36. A farmer exchanged 17 barrels of apples worth $5 a barrel, for 12 cords of wood at $7 a cord. Did he gain or lose, and how much?

VI.

1. $6 \times 4, -3, +9, \times 2, -40, +5, \times 4 = ?$
2. $18 - 8, \times 10, -75, \times 2, -50, +1 = ?$
3. $37 - 3, -30, \times 6, +17, -65, \times 8 = ?$
4. $14 \times 4, -6, +13, +17, -65, \times 8, \times 11, -41 = ?$
5. $12 \times 9, -90, \times 3, -4, +11, -37, \times 5, -16 = ?$
6. $130 - 75, +5, \times 8, -400, +20, -68, \times 3 = ?$
7. $7 + 3, -4, +27, -6, -12, \times 8, -26 = ?$

8. 144—24, +80,—170, ×2, +4,—30, ×2,—64=?
9. 19+7, ×5,—125, +9,—3, ×12,—32,—16=?
10. 33—13, ×8,—70, +10, ×3,—150, +25=?

Case I.

When the multiplier contains only one figure.

1. Let it be required to multiply 895 by 7.

Operation.

Multiplicand, 895
Multiplier, 7
Product, 6265

Solution.—After writing the multiplier under the lowest order of the multiplicand and drawing a line, we begin to multiply at the right. 7 times 5 units, are 35 units, which are equal to 3 tens and 5 units. We write the 5 in units place, and reserve the 3 tens to be added to the product of the tens. Multiplying 9 tens by 7 we get 63 tens, which increased by the 3 tens reserved, give 66 tens, or 6 hundreds and 6 tens. We set down the 6 tens in tens place, and reserve the 6 hundreds to add to the next product. 7 times 8 hundreds are 56 hundreds, plus the 6 hundreds reserved, make 62 hundreds, or 6 thousand and 2 hundreds. As we have no more orders to multiply, we put the 6 thousands and two hundreds in their proper places. The resulting number, 6265, is the required product.

Illustrations.

(2.)	(3.)	(4.)	(5.)	(6.)	(7.)
213	432	341	526	$7.43	$5.26
1	3	4	6	7	5
213	1296	1364	3156	$52.01	$26.30

WRITTEN EXERCISES.

Multiply:

8. 879 by 7. *Ans.* 6153.
9. 692 by 6. *Ans.* 4152.
10. 796 by 8. *Ans.* 6368.
11. 476 by 3. *Ans.* 1428.
12. 582 by 5. *Ans.* 2910.
13. 607 by 6. *Ans.* 3642.
14. 840 by 3. *Ans.* 2520.
15. 736 by 2. *Ans.* 1472.
16. 913 by 4. *Ans.* 3652.
17. 619 by 6. *Ans.* 3714.
18. 495 by 3. *Ans.* 1485.
19. 856 by 9. *Ans.* 7704.
20. 763 by 8. *Ans.* 6104.
21. 259 by 7. *Ans.* 1813.
22. 387 by 6. *Ans.* 2322.
23. 954 by 9. *Ans.* 8586.
24. 832 by 4. *Ans.* 3328.
25. 604 by 8. *Ans.* 4832.
26. 386 by 4. *Ans.* 1544.
27. 945 by 7. *Ans.* 6615.
28. 776 by 6. *Ans.* 4656.
29. 525 by 8. *Ans.* 4200.
30. 378 by 7. *Ans.* 2646.
31. 267 by 9. *Ans.* 2403.
32. 156 by 5. *Ans.* 780.
33. 801 by 2. *Ans.* 1602.
34. 307 by 4. *Ans.* 1228.
35. 471 by 6. *Ans.* 2826.
36. 167 by 9. *Ans.* 1503.
37. 516 by 7. *Ans.* 3612.
38. 165 by 2. *Ans.* 330.
39. 722 by 8. *Ans.* 5776.
40. 249 by 4. *Ans.* 996.

41. 3807 by 9.
42. 2918 by 7.
43. 4792 by 8.
44. 7587 by 4.
45. 6315 by 6.
46. 9054 by 5.
47. 8117 by 2.
48. 3948 by 3.
49. 79458 by 8.
50. 27935 by 7.
51. 17092 by 9.
52. 46181 by 4.
53. 31953 by 5.
54. 67209 by 8.
55. 36431 by 9.
56. 90038 by 6.
57. 783206 by 7.
58. 405182 by 6.
59. 178420 by 5.
60. 473824 by 5
60. 218793 by 9.
62. 380697 by 2.
63. 307901 by 8.
64. 904905 by 3.
65. 302163 by 7.
66. 235619 by 6.
67. 819273 by 5.
68. 193111 by 4.
69. 374952 by 8.
70. 506044 by 9.

1. If a horse cost $180, what will 9 horses cost at the same rate?
2. What will 21780 pounds of beef cost at 8 cents per pound?
3. If a barrel of flour cost $9, what will 2376 barrels cost?
4. What will 7 farms cost, at the rate of $56450 each?
5. If there are 5280 feet in a mile, how many feet in 6 miles?
6. If a man travel 7249 miles in one year, how many miles will he travel in 4 years?
7. How much will a merchant gain in 5 years, at the rate of $41695 a year?
8. How much will a grocer pay for 2564 heads of cabbage at 3 cents a head?
9. At $4 a cord what will 8596 cords of wood cost?
10. If a boy earn $6 a week, how much will he earn in 260 weeks?
11. If it take a tailor 7 days to make a suit of clothes, how long will it take him to make 426 suits?
12. There are 52 weeks in a year, how many weeks in 8 years?

Case II.

When the multiplier contains more than one figure.

1. Find the product of 643 by 58.

OPERATION.

Multiplicand, 643
Multiplier, 58

1st. partial product.	$5144 = 643 \times 8$
2nd partial product.	$3215 = 643 \times 50$
Product	$37294 = 643 \times 58$

Solution.—Having written the multiplier under the multiplicand so that units stand under units, tens under tens, &c, we begin at the right hand and multiply all the parts of the multiplicand successively, by each term of the multiplier. Since 58 is equal to 5 tens and 8 units, 58 times

643 must be equal to 5 tens times 643 plus 8 units times 643. Having found 8 units times 643 by the rule under Case I, to be 5144, we set it down as the first partial product. To find 5 tens times 643, we begin by multiplying 3 units by 5 tens, which gives 15 tens, or 150 units. Omitting the naught for units place, we set down the 5 tens in tens place and carry the 1 hundred to the next product. By multiplying the remaining terms of the multiplicand by the 5 tens of the multiplier, and carrying as before, we obtain the second partial product 32150; which is equal to 5 tens or 50 times 643. Now, by adding the partial products, 5144 and 32150, we find the entire product 37294. In like manner we may find the products of any two numbers, being careful to place the first figure of each partial product under the corresponding figure of the multiplier.

ILLUSTRATIONS.

(2.)	(3.)	(4.)	(5.)
327	46	316	435
46	327	63	78
1962	322	948	3480
1308	92	1896	3045
15042	138	19908	33930
	15042		

(6.)	(7.)	(8.)	(9.)	(10.)
263	425	548	318	862
32	21	45	25	59

WRITTEN EXERCISES:

Multiply:

11. 354 by 19. *Ans.* 6726.
12. 295 by 23. *Ans.* 6785.
13. 359 by 36. *Ans.* 12924.
14. 487 by 28. *Ans.* 13636.
15. 546 by 32. *Ans.* 17472.
16. 674 by 45. *Ans.* 30330.
17. 906 by 53. *Ans.* 48018.
18. 863 by 25. *Ans.* 21575.
19. 735 by 42. *Ans.* 30870.
20. 683 by 56. *Ans.* 38248.

21. 521 by 39. *Ans.* 20319.
22. 644 by 76. *Ans.* 48944.
23. 978 by 41. *Ans.* 40098.
24. 872 by 47. *Ans.* 40984.
25. 761 by 58. *Ans.* 44138.
26. 408 by 69. *Ans.* 28152.
27. 607 by 78. *Ans.* 47346.
28. 329 by 84. *Ans.* 27636.
29. 534 by 93. *Ans.* 49662.
30. 285 by 74. *Ans.* 21090.
31. 862 by 49. *Ans.* 42238.
32. 794 by 24. *Ans.* 19056.
33. 827 by 52. *Ans.* 43004.
34. 502 by 71. *Ans.* 35642.
35. 288 by 42. *Ans.* 12096.
36. 839 by 89. *Ans.* 74671.
37. 319 by 75. *Ans.* 23925.
38. 417 by 93. *Ans.* 38781.
39. 523 by 87. *Ans.* 45501.
40. 198 by 76. *Ans.* 15048.
41. 879 by 34. *Ans.* 29886.
42. 725 by 77. *Ans.* 55825.
43. 306 by 37. *Ans.* 11322.
44. 696 by 58. *Ans.* 40368.
45. 287 by 69. *Ans.* 19803.
46. 914 by 28. *Ans.* 25592.
47. 549 by 68. *Ans.* 37332.
48. 705 by 99. *Ans.* 69795.
49. 367 by 52. *Ans.* 19084.
50. 497 by 44. *Ans.* 21868.
51. 447 by 63. *Ans.* 28161
52. 316 by 18. *Ans.* 5688
53. 8736 by 96. *Ans.* 838656
54. 5485 by 88. *Ans.* 482680
55. 7137 by 25. *Ans.* 178425
56. 8409 by 63. *Ans.* 529767
57. 6523 by 35. *Ans.* 228305
58. 9046 by 47. *Ans.* 425162
59. 52877 by 28.
60. 918624 by 33.
61. 270391 by 86.
62. 165197 by 75.
63. 2394 by 271
64. 3164 by 315.
65. 1282 by 436.
66. 4739 by 316.
67. 5321 by 427.
68. 3246 by 245.
69. 4871 by 562.
70. 6547 by 374.
71. 6293 by 853.
72. 9785 by 976.
73. 5482 by 735.
74. 8673 by 193.
75. 907284 by 352.
76. 730725 by 639.
77. 2842753 by 784.
78. 9316924 by 628.
79. 9454765 by 475.

45. Annexing a cipher to a number moves each of its digits one place to the left, thus converting units into tens, tens into hundreds &c.; which is the same as multiplying the number by 10. Hence, to multiply a number by 10, we annex one cipher; to multiply it by 100, we annex two ciphers; and so on.

ILLUSTRATIONS.

1. Multiply 35 by 240.

OPERATION.

35
24 | 0

140
70

840 | 0

2. Multiply 3500 by 240.

OPERATION.

35 | 00
24 | 0

140
70

840 | 000

Multiply:

3.	8607 by	10	*Ans.*	86070.
4.	68038 by	100	*Ans.*	6803800.
5.	780 by	100	*Ans.*	78000.
6.	38600 by	10	*Ans.*	386000.
7.	37862 by	1000	*Ans.*	37862000.
8.	98630 by	1000		
9.	86421 by	10000		
10.	378200 by	100000		
11.	394 by	200		
12.	5860 by	320		
13.	8790 by	4600		
14.	1576 by	3000		
15.	1700 by	4200		
16.	2030 by	5000	*Ans.*	10150000.
17.	10800 by	250	*Ans.*	2700000.
18.	46200 by	7130		

19. 47300 by 16000
20. 25000 by 16500
21. 70500 by 40500
22. 40900 by 32000
23. 98000 by 76000
24. 53200 by 10300
25. 386000 by 147000
26. 70200 by 2060
27. 4930 by 74000
28. 405000 by 3070000.

UNITED STATES CURRENCY.

46. When one of the factors contains *cents*, or *dollars* and *cents*, multiply as in simple numbers. Point off two places from the right, in the product, and prefix the sign $.

1. What cost 27 tons of coal at $5.75 a ton?

OPERATION.

$5.75
27

4025
1150

$155.25

SOLUTION.—If one ton cost $5.75, 27 tons will cost 27 times $5.75, which is $155.25. Since the multiplicand contains cents, we must point off two places in the product.

2. What will 37 barrels of flour cost at $6.85 a barrel? *Ans.* $253.45.
3. Multiply $472.66 by 27. *Ans.* $12761.82.
4. Multiply $1826.37 by 160. *Ans.* $292219.20.
5. Multiply $892.06 by 327. *Ans.* $291703.62.
6. Multiply $2932.25 by 1408. *Ans.* $4128608.00.
7. If an acre of land is worth $237.82, what are 482 acres worth? *Ans.* $114629.24.

8. At $4.80 a bushel, what will 625 bushels of flaxseed cost? *Ans.* $3000.00.

9. What cost 83 bushels of corn, at 75 cents a bushel? *Ans.* $62.25.

10. What cost 145 yards of sheeting at 8 cents a yard? *Ans.* $11.60.

11. At $4.63 a head, what will 378 sheep cost? *Ans.* $1750.14.

12. What cost 8 pieces of calico, each piece containing 25 yards, at 7 cents a yard? *Ans.* $14.00.

13. How much will a grocer pay for 2 chests of tea each containing 65 pounds, at 65 cents a pound? *Ans.* $84.50.

14. What will 19 hogsheads of vinegar cost, each containing 63 gallons, at 23 cents a gallon? *Ans.* $275.31.

15. Bought 9 cows at $30 each, 13 horses at $135 each, and 300 sheep at $3.50 each; what was the entire cost? *Ans.* $3075.

16. A merchant purchased 27 pieces of cloth each containing 54 yards, at $3.33 a yard, and sold it for $3.45 a yard; how much did he gain? *Ans.* $174.96.

17. A flour merchant bought 450 barrels of flour for $3262.50, and sold them for $8.63 a barrel; what did he gain? *Ans.* $621.00.

18. A man earns $3.25 a day, and his daily expenses are $1.89; how much will he save in 365 days? *Ans.* $496.40.

19. I sold 13 bales of cotton cloth, each bale containing 10 pieces, and each piece 19 yards at .05 per yard; what did I receive for the whole?

WRITTEN EXERCISES.

(1)	(2)	(3)	(4)	(5)
156	392	450	1056	395
7	8	4	9	5

(6)	(7)	(8)	(9)	(10
7002	5062	7893	3956	4963
28	15	26	38	42

(11)	(12)	(13)	(14)	(15)
3963	7892	5632	7932	5062
49	25	78	51	97

(16)	(17)	(18)	(19)	(20)
3973	4963	9963	6893	4563
42	55	75	123	207

(21)	(22)	(23)	(24)	(25)
7096	8967	4963	8963	7006
235	907	294	204	752

(26)	(27)	(28)	(29)	(30)
10034	4006	79632	45632	8963
896	305	800	607	404

Multiply:

31.	965 by 7.	*Ans.*	6755.
32.	1063 by 156.	*Ans.*	165828.
33.	365 by 45.	*Ans.*	16425.
34.	7362 by 71.	*Ans.*	522702.
35.	962 by 15.	*Ans.*	14430.
36.	2063 by 9.	*Ans.*	18567.
37.	356 by 19.		
38.	4906 by 21.		
39.	79602 by 59.		
40.	79632 by 61.		
41.	89213 by 76.		
42.	5603 by 101.		
43.	9632 by 569.		
44.	7326 by 29.		
45.	80632 by 108.		
46.	7963 by 75.		
47.	8932 by 276.		
48.	8534 by 962.		
49.	70021 by 603.		
50.	50632 by 493.		
51.	8934 by 132.		
52.	28561 by 175.		
53.	3962 by 581.		
54.	8963 by 705.		
55.	7963 by 396.		
56.	50062 by 289.		
57.	85632 by 5063.		
58.	7009 by 304.		
59.	45631 by 792.		
60.	20063 by 142.		

DIVISION.

——:o:——

47. ***Division*** is the process of finding how many times one number is contained in another of the same kind.

DIVISION TABLE.

0 divided by 1 equals 0; 0 divided by 2 equals 0; 0 divided by any number equals 0.

1÷1=1	2÷2=1	3÷3=1	4÷4=1
2÷1=2	4÷2=2	6÷3=2	8÷4=2
3÷1=3	6÷2=3	9÷3=3	12÷4=3
4÷1=4	8÷2=4	12÷3=4	16÷4=4
5÷1=5	10÷2=5	15÷3=5	20÷4=5
6÷1=6	12÷2=6	18÷3=6	24÷4=6
7÷1=7	14÷2=7	21÷3=7	28÷4=7
8÷1=8	16÷2=8	24÷3=8	32÷4=8
9÷1=9	18÷2=9	27÷3=9	36÷4=9

5÷5=1	6÷6=1	7÷7=1	8÷8=1
10÷5=2	12÷6=2	14÷7=2	16÷8=2
15÷5=3	18÷6=3	21÷7=3	24÷8=3
20÷5=4	24÷6=4	28÷7=4	32÷8=4
25÷5=5	30÷6=5	35÷7=5	40÷8=5
30÷5=6	36÷6=6	42÷7=6	48÷8=6
35÷5=7	42÷6=7	49÷7=7	56÷8=7
40÷5=8	48÷6=8	56÷7=8	64÷8=8
45÷5=9	54÷6=9	63÷7=9	72÷8=9

$9 \div 9 = 1$	$10 \div 10 = 1$	$11 \div 11 = 1$	$12 \div 12 = 1$
$18 \div 9 = 2$	$20 \div 10 = 2$	$22 \div 11 = 2$	$24 \div 12 = 2$
$27 \div 9 = 3$	$30 \div 10 = 3$	$33 \div 11 = 3$	$36 \div 12 = 3$
$36 \div 9 = 4$	$40 \div 10 = 4$	$44 \div 11 = 4$	$48 \div 12 = 4$
$45 \div 9 = 5$	$50 \div 10 = 5$	$55 \div 11 = 5$	$60 \div 12 = 5$
$54 \div 9 = 6$	$60 \div 10 = 6$	$66 \div 11 = 6$	$72 \div 12 = 6$
$63 \div 9 = 7$	$70 \div 10 = 7$	$77 \div 11 = 7$	$84 \div 12 = 7$
$72 \div 9 = 8$	$80 \div 10 = 8$	$88 \div 11 = 8$	$96 \div 12 = 8$
$81 \div 9 = 9$	$90 \div 10 = 9$	$99 \div 11 = 9$	$108 \div 12 = 9$

ORAL EXERCISES.

I.

$6 \div 2 = ?$	$14 \div 2 = ?$	$24 \div 8 = ?$	$48 \div 6 = ?$
$8 \div 1 = ?$	$18 \div 3 = ?$	$28 \div 4 = ?$	$45 \div 5 = ?$
$9 \div 9 = ?$	$16 \div 4 = ?$	$20 \div 5 = ?$	$48 \div 12 = ?$
$4 \div 2 = ?$	$15 \div 3 = ?$	$32 \div 4 = ?$	$44 \div 11 = ?$
$6 \div 3 = ?$	$12 \div 2 = ?$	$30 \div 6 = ?$	$49 \div 7 = ?$
$8 \div 4 = ?$	$12 \div 3 = ?$	$35 \div 7 = ?$	$56 \div 8 = ?$
$9 \div 3 = ?$	$18 \div 2 = ?$	$36 \div 9 = ?$	$50 \div 10 = ?$
$8 \div 2 = ?$	$25 \div 5 = ?$	$32 \div 8 = ?$	$54 \div 9 = ?$
$7 \div 1 = ?$	$24 \div 4 = ?$	$36 \div 6 = ?$	$64 \div 8 = ?$
$6 \div 6 = ?$	$27 \div 3 = ?$	$40 \div 5 = ?$	$63 \div 7 = ?$

II.

$\frac{16}{2} = ?$	$\frac{27}{9} = ?$	$\frac{72}{9} = ?$	$\frac{10}{2} = ?$
$\frac{5}{1} = ?$	$\frac{28}{7} = ?$	$\frac{81}{9} = ?$	$\frac{54}{6} = ?$
$\frac{8}{8} = ?$	$\frac{30}{5} = ?$	$\frac{84}{12} = ?$	$\frac{96}{12} = ?$
$\frac{24}{3} = ?$	$\frac{33}{11} = ?$	$\frac{36}{12} = ?$	$\frac{72}{8} = ?$
$\frac{36}{4} = ?$	$\frac{35}{5} = ?$	$\frac{48}{8} = ?$	$\frac{40}{5} = ?$
$\frac{24}{6} = ?$	$\frac{42}{6} = ?$	$\frac{30}{10} = ?$	$\frac{90}{10} = ?$
$\frac{20}{4} = ?$	$\frac{45}{9} = ?$	$\frac{10}{5} = ?$	$\frac{42}{7} = ?$
$\frac{16}{8} = ?$	$\frac{56}{7} = ?$	$\frac{99}{11} = ?$	$\frac{77}{11} = ?$
$\frac{14}{7} = ?$	$\frac{60}{12} = ?$	$\frac{80}{10} = ?$	$\frac{18}{6} = ?$
$\frac{12}{4} = ?$	$\frac{63}{9} = ?$	$\frac{72}{12} = ?$	$\frac{40}{8} = ?$

III.

$15 \div 5 = ?$	$23 \div 3 = ?$	$57 \div 10 = ?$	$82 \div 10 = ?$
$16 \div 5 = ?$	$10 \div 4 = ?$	$73 \div 8 = ?$	$74 \div 11 = ?$
$12 \div 6 = ?$	$42 \div 8 = ?$	$66 \div 7 = ?$	$35 \div 4 = ?$
$14 \div 6 = ?$	$17 \div 6 = ?$	$69 \div 8 = ?$	$27 \div 4 = ?$
$21 \div 7 = ?$	$12 \div 7 = ?$	$95 \div 11 = ?$	$99 \div 12 = ?$
$24 \div 7 = ?$	$19 \div 3 = ?$	$87 \div 12 = ?$	$55 \div 7 = ?$
$40 \div 8 = ?$	$25 \div 6 = ?$	$65 \div 9 = ?$	$81 \div 12 = ?$
$46 \div 8 = ?$	$34 \div 5 = ?$	$18 \div 11 = ?$	$75 \div 9 = ?$
$18 \div 9 = ?$	$43 \div 5 = ?$	$44 \div 7 = ?$	$63 \div 10 = ?$
$26 \div 9 = ?$	$53 \div 9 = ?$	$58 \div 9 = ?$	$51 \div 6 = ?$

IV.

$22 \div 2 = ?$	$93 \div 3 = ?$	$48 \div 3 = ?$	$78 \div 7 = ?$
$36 \div 3 = ?$	$68 \div 2 = ?$	$75 \div 5 = ?$	$43 \div 3 = ?$
$48 \div 4 = ?$	$50 \div 5 = ?$	$60 \div 5 = ?$	$61 \div 4 = ?$
$55 \div 5 = ?$	$66 \div 6 = ?$	$96 \div 8 = ?$	$79 \div 5 = ?$
$88 \div 4 = ?$	$86 \div 2 = ?$	$84 \div 7 = ?$	$75 \div 4 = ?$
$28 \div 2 = ?$	$84 \div 4 = ?$	$91 \div 7 = ?$	$94 \div 6 = ?$
$46 \div 2 = ?$	$63 \div 3 = ?$	$78 \div 6 = ?$	$82 \div 7 = ?$
$69 \div 3 = ?$	$96 \div 8 = ?$	$85 \div 5 = ?$	$33 \div 2 = ?$
$77 \div 7 = ?$	$44 \div 2 = ?$	$42 \div 4 = ?$	$47 \div 3 = ?$
$64 \div 2 = ?$	$99 \div 9 = ?$	$51 \div 3 = ?$	$58 \div 4 = ?$

V.

$(12 + 6) \div 3 = ?$	$(37 + 16) \div 9 = ?$	$(6 \times 9) \div 7 = ?$
$(20 + 4) \div 12 = ?$	$(29 - 13) \div 6 = ?$	$48 \div (2 \times 6) = ?$
$(17 + 11) \div 2 = ?$	$(48 - 7) \div 11 = ?$	$36 \div (3 \times 4) = ?$
$(26 - 6) \div 4 = ?$	$(7 \times 6) \div 3 = ?$	$72 \div (4 \times 2) = ?$
$(18 - 8) \div 2 = ?$	$(8 \times 9) \div 6 = ?$	$64 \div (3 \times 2) = ?$
$(47 - 5) \div 6 = ?$	$(6 \times 4) \div 2 = ?$	$96 \div (8 \times 3) = ?$
$(19 + 17) \div 5 = ?$	$(5 \times 8) \div 4 = ?$	$84 \div (3 \times 4) = ?$

(18— 6)÷(4+2)=?
(36— 9)÷(1+4)=?
(84— 4)÷(3+7)=?
(63— 8)÷(11—6)=?
(76+12)÷(14—3)=?
(36+ 7)÷(8—1)=?
(42+23)÷(3+2)=?
(86+ 4)÷(6+3)=?
(7× 8)÷(4×2)=?
(8× 9)÷(4×3)=?

(47— 7)÷(3×1)=?
(93— 8)÷(6×2)=?
(43+ 7)÷(3×5)=?
(48+12)÷(6×4)=?
(8× 9)÷(4×3)=?
(7÷ 6)÷(9+1)=?
(8×11)÷(3+6)=?
(7× 9)÷(17—3)=?
(78÷ 6)÷(3×4)=?
(93÷ 3)÷(72÷9)=?

VI.

1. At 4 cents a piece how many oranges can be bought for 16 cents? 28 cents? 32 cents? 20 cents? 8 cents?

2. A man earns $2 a day. How long will it take him to earn $18? $4? $6? $12? $2?

3. How many yards of muslin can be bought for 72 cents, at 6 cents a yard? 8 cents? 12 cents? 9 cents?

4. How many times can 5 yards of cloth be taken from a piece containing 25 yards? 45 yards? 60 yards? 30 yards?

5. By writing 8 lines a day how many days will it take John to write 56 lines? 16 lines? 64 lines? 88 lines? 40 lines?

6. At 11 cents a pound, how many pounds of sugar can be bought for 88 cents? 55 cents? 99 cents? 22 cents?

7. If one man can do a piece of work in 36 days, how long will it take 9 men to do it? 4 men? 6 men? 3 men? 8 men?

8. Divide 24 into 3 equal parts. Into 6 equal parts.

9. How many dozen of eggs at 9 cents a dozen, can be bought for $1.08? 81 cents? 63 cents? 99 cents?

10. There are 4 quarts in a gallon; how many gallons in 36 quarts? 48 quarts? 12 quarts? 44 quarts?

11. From a farm containing 110 acres, how many lots of 10 acres each can be sold?

12. How many sheep at $7 a head can be bought for $49? $21? $14? $35? $63?

13. There are 12 months in a year; how many years in 84 month? 60 months? 120 months?

14. In what number of days will a man travel 30 miles, at the rate of 5 miles a day?

15. How many times 9 is 6 times 12?

16. At $2 a piece, how many hats can be purchased for $32? $48? $72? $86?

17. Mr. Johnson travelled 140 miles in 7 days; how many miles did he travel each day?

18. How often is 5 contained in 75? 95? 60?

19. How many barrels of apples, at $3 a barrel can be purchased for $72? $65? $39?

20. A farmer bought sheep for $60, at the rate of $4 a head. How many did he buy?

21. How many barrels of flour can be sold for $120 at $8 per barrel?

22. If 9 barrels of flour cost $63, what will 7 barrels cost?

23. If a man earn $55 in 5 weeks, how much will he earn in 11 weeks?

24. If 8 yards of cloth cost $48, what will 12 yards cost? 16 yards? 9 yards? 14 yards?

25. What will 5 tons of hay cost, if two tons cost $26? $18? $30? $36?

26. How many bottles of mucilage at 10 cents a bottle, will pay for 40 copies at 4 cents each?

27. At the rate of 28 miles in 7 hours, how far would a man travel in 20 hours? 11 hrs.? 14 hrs.?

28. How many bedsteads at $6 each, can be bought for 11 boxes of oranges at $6 each, and $18 worth of lemons?

29. How many fancy lead-pencils at 9 cents each, will pay for 5 tops at 6 cents each, and 11 three-cent stamps?

30. How many times can a father divide $90 among his three sons, giving each $5 every time?

VII.

1. $5 \times 4, \div 2, +7, -3 \times 6, -24, +6, \div 11, +4 = ?$
2. $3 + 13, \times 5, -60, -5, \times 3, +4, \div 7, -2, +8, \times 3 = ?$
3. $27 - -3, \div 8, +9, \times 6, -50, \times 3, -16, +25, \div 3 = ?$
4. $48 \div 6, +3, \times 9, +1, \div 10, -4, \times 13, -8, \div 7, +4 = ?$
5. $144 \div 12, -1, \times 11, -13, \div 9, -5, \times 6, -2, \div 10 = ?$
6. $7 \times 9, -3, \div 4, +3, \times 3, -4, \times 2, -19, \div 9 = ?$
7. $36 + 9, \div 5, +2, \div 3, +4, \times 5, -25, \div 8, +6 = ?$
8. $21 + 9, \times 4, -10, \div 11, +16, \div 2, -3, -1, \times 9 = ?$
9. $108 \div 12, +11, +4, \div 4, +1, \times 7, -2, \div 3, \times 7 = ?$
10. $86 - 31, \div 11, +17, -4, \div 9, +7, \times 4, +11, -2 = ?$

SHORT DIVISION.

1. Let it be required to divide 32540 by 5.

OPERATION.

Dividend
Divisor 5) 32540
———
Quotient 6508

SOLUTION.—Having written the divisor at the left of the dividend, with a curved line between them, we begin at the left to divide the different parts of the dividend by the divisor. Since 5 is not contained in 3 we divide 32 by 5. This gives 6 thousands for a quotient and 2 thousands for a remainder. We write the 6 thousands under the thousands, and to the remaining 2 thousands we annex the next figure which is 5 hundreds. 2 thousands and five hundreds are equal to 25 hundreds. 5 is contained in 25 hundreds, 5 hundreds times. Since there is no remainder, and since 4 is less than 5, there are no tens in the quotient. We therefore write 0 in the place of tens, and annex the following figure to the four tens making 40 units. Dividing 40 units by 5 we obtain 8 units, which we place in the quotient under units. Hence the number 6508, being the sum of all the partial quotients obtained by dividing the parts of the dividend by the divisor, is the required quotient.

ILLUSTRATIONS.

(2.)	(3.)	(4.)	(5.)
4) 672	6) 287	7) 903	8) 8145
Ans. 168	$47\frac{5}{6}$	129	$1018\frac{1}{8}$
168	47	129	1018
4	6	7	8
Proof ———	———	———	———
672	282	903	8144
	5		1
	———		———
	287		8145

WRITTEN EXERCISES.

Divide:

6. 840 by 4. *Ans.* 210.
7. 950 by 5. *Ans.* 190.
8. 834 by 6. *Ans.* 139.
9. 399 by 7. *Ans.* 57.
10. 441 by 9. *Ans.* 49.
11. 392 by 8. *Ans.* 49.
12. 616 by 7. *Ans.* 88.
13. 555 by 3. *Ans.* 185.

14. 711 by 9
15. 736 by 8
16. 879 by 5
17. 384 by 6
18. 472 by 4
19. 938 by 3
20. 477 by 2
21. 2735 by 7
22. 8945 by 6
23. 2147 by 8
24. 6092 by 9
25. 8070 by 8
26. 6439 by 6
27. 8296 by 7
28. 7350 by 5
29. 5837 ÷ 4
30. 4002 ÷ 3
31. 73504 ÷ 8

32. 24319 ÷ 9
33. 36848 ÷ 6
34. 20895 ÷ 5
35. 49763 ÷ 7
36. 93007 ÷ 3
37. 86214 ÷ 5
38. 53720 ÷ 9
39. 38808 ÷ 3
40. 10738 ÷ 4
41. 345678 ÷ 9
42. 744018 ÷ 8
43. 456843 ÷ 7
44. 945600 ÷ 6
45. 347017 ÷ 7
46. 532801 ÷ 5
47. 8077636 ÷ 8
48. 6300857 ÷ 4
49. 90437284 ÷ 9

50. 76110884 ÷ 3

51. If a hat cost $3, how many hats at the same rate can a hatter buy for $219?

52. A gentleman divided $560 among some poor persons, giving $4 to each; how many poor persons were there?

53. If one slate cost 8 cents how many slates can be bought for 816 cents?

54. At $5 a cord how many cords of wood could I buy for $785?

55. At the rate of 7 miles an hour, how long would it take a man to travel 5894 miles?

56. How many sheep can be bought for $3216 at the rate of $6 per head?

57. In how many days will a bank realize $35082, if its profits are $9 a day?

58. If Henry can read 8 pages of history in one hour, how long will it take him to read 504 pages?

59. There are 7 days in a week; how many weeks in 1820 days?

60. How many nails 3 inches long may be made from a piece of iron 3860 inches long?

61. How long will it take a man to save $20537 if he put by $12 each week?

62. A merchant gained 139875 dollars in 11 years; what was his average yearly gain?

63. How many loads may be taken from a bank of gravel of 32806 cubic feet, if each load contain 11 cubic feet?

LONG DIVISION.

1. Let it be required to divide 50289 by 372.

OPERATION.

Divisor. Dividend. Quotient.

372) 50289 (135
372

1308
1116

1929
1860

Remainder, 69

SOLUTION.—Since 372 is not contained in 5 tens of thousands, or in 50 thousands any thousands times, there are no thousands in the quotient. Annexing the next figure, 2, we have 502 hundreds. 372 is contained in 502 hundreds 1 hundred times with a remainder. Write the 1 hundred in the quotient and multiply the divisor by it, subtracting the product from the 502 hundreds. This gives for remainder 130 hundreds; to which we annex the next figure 8 tens, making 1308 tens for the next partial dividend. The quotient of 1308 tens by 372 is greater than 3 and less than 4; hence there are 3 tens in the quotient. Multiplying 372 by 3 tens, we have 1116 tens, and this taken from 1308 tens, leaves 192 tens; to which we annex the next figure 9 units, making 1929 units. 372 is contained in 1929 units, 5 times with a remainder. Writing the 5 units in the quotient, and multiplying and subtracting as before, we obtain the remainder 69. Hence the quotient is 1 hundred, 3 tens, and 5 units or 135, with a remainder of 69.

2. Divide 1062934 by 306, and prove it.

OPERATION.

Divisor Dividend Quotient.

306) 1062934 (3473
918

1449
1224

2253
2142

1114
918

Remainder 196

PROOF.

3473 Quotient.
306 Divisor.

20838
10419

1062738
196 Remainder.

1062934 Dividend.

WRITTEN EXERCISES.

3.	$888 \div 37$.	*Ans.* 24.
4.	$936 \div 52$.	*Ans.* 18.
5.	$975 \div 25$.	*Ans.* 39.
6.	$456 \div 24$.	*Ans.* 19.
7.	$924 \div 33$.	*Ans.* 28.
8.	$546 \div 13$.	*Ans.* 42.
9.	$804 \div 67$.	*Ans.* 12.
10.	$946 \div 43$.	*Ans.* 22.
11.	$608 \div 38$.	*Ans.* 16.
12.	$894 \div 76$.	*Ans.* $11\frac{58}{76}$.
13.	$247 \div 19$.	*Ans.* 13.
14.	$493 \div 27$.	*Ans.* $18\frac{7}{27}$.
15.	$816 \div 80$.	*Ans.* $10\frac{16}{80}$.
16.	$306 \div 18$.	*Ans.* 17.
17.	$537 \div 46$.	*Ans.* $11\frac{31}{46}$.
18.	$732 \div 61$.	*Ans.* 12.
19.	$364 \div 29$.	*Ans.* $12\frac{16}{29}$.
20.	$604 \div 54$.	*Ans.* $11\frac{10}{54}$.
21.	$477 \div 53$.	*Ans.* 9.
22.	$836 \div 44$.	*Ans.* 19.
23.	$4214 \div 49$.	*Ans.* 86.
24.	$1335 \div 15$.	*Ans.* 89.
25.	$1617 \div 21$.	*Ans.* 77.

26.	$1081 \div 23$	33.	$8864 \div 92$
27.	$6184 \div 58$	34.	$5621 \div 77$
28.	$8476 \div 83$	35.	$1209 \div 31$
29.	$7581 \div 47$	36.	$2151 \div 57$
30.	$3544 \div 93$	37.	$3864 \div 86$
31.	$6450 \div 25$	38.	$12194 \div 67$
32.	$8643 \div 34$	39.	$13314 \div 42$

40.	38584 ÷ 53	44.	74099 ÷ 83
41.	10166 ÷ 26	45.	64584 ÷ 71
42.	70308 ÷ 37	46.	72259 ÷ 41
43.	436501 ÷ 95		

47.	80819 ÷	64.	*Ans.*	$1262\frac{51}{64}$.
48.	32406 ÷	33.	*Ans.*	982.
49.	40950 ÷	126.	*Ans.*	325.
50.	72828 ÷	867.	*Ans.*	84.
51.	51084 ÷	396.	*Ans.*	129.
52.	47025 ÷	627.	*Ans.*	75.
53.	80257 ÷	913.	*Rem.*	826.
54.	74670 ÷	108.	*Rem.*	42.
55.	145132 ÷	307.	*Rem.*	228.
56.	143682 ÷	462.	*Ans.*	311.
57.	734536 ÷	136.	*Ans.*	5401.
58.	350479 ÷	320.	*Rem.*	79.
59.	504800 ÷	208.	*Rem.*	192.
60.	3971954 ÷	427.	*Ans.*	9302.
61.	8450834 ÷	889.	*Ans.*	9506.
62.	1317296 ÷	232.	*Ans.*	5678.
63.	6131043 ÷	681.	*Ans.*	9003.
64.	1880810 ÷	397.	*Rem.*	221.
65.	4020621 ÷	5007.	*Ans.*	803.
66.	5718006 ÷	6873.	*Rem.*	6543.
67.	609960 ÷	1326.	*Ans.*	460.
68.	1220313 ÷	4503.	*Ans.*	271.
69.	4605430 ÷	7663.	*Rem.*	7630.

70.	187790 ÷ 2110	75.	4268004 ÷ 5300
71.	273631 ÷ 7329	76.	2462776 ÷ 3709
72.	408576 ÷ 4864	77.	646301 ÷ 8219
73.	1395940 ÷ 3068	78.	11590744 ÷ 1352
74.	2987620 ÷ 6020	79.	16815620 ÷ 3470

80.	24134744 ÷ 4072	86.	28898922 ÷ 88647
81.	32174272 ÷ 77432	87.	7292924368 ÷ 846007
82.	12655696 ÷ 56752	88.	3289054376 ÷ 13792
83.	63000180 ÷ 86420	89.	10824675400 ÷ 520117
84.	7047400 ÷ 33400	90.	65642058 ÷ 326474
85.	5787688 ÷ 44671		

UNITED STATES CURRENCY.

48. Reduce the dividend to cents if necessary, and divide as in simple numbers. The quotient will be the answer in cents; which may be reduced to dollars and cents by placing the separating point two places from the right.

49. When both dividend and divisor are in currency, reduce each to cents if necessary, and divide as in simple numbers. The quotient will be the required number.

ILLUSTRATIONS.

1. Divide \$187 equally among 13 men.

2. For \$600 how many barrels of flour can be bought at \$7.50 per barrel?

(1.)

cents. cents.
13) 187.00 (1438
13
or \$14.38
57
52
50
39
110
104
6

(2.)

7.50) 600.00 (80 barrels.
6000
0

WRITTEN EXERCISES.

3. Divide \$396.76 by 28. *Ans.* \$14.17.
4. Divide \$1308.24 by 79. *Ans.* \$16.56.
5. Divide \$6048 by 108. *Ans.* \$56.
6. Divide \$37806.29 by 392. *Ans.* \$96.44+
7. Divide \$99.88 by 11cents. *Ans.* 908.
8. Divide \$137.97 by 63cents. *Ans.* 219.
9. Divide \$15275 by \$325. *Ans.* 47.
10. Divide \$9672 by \$806. *Ans.* 12.
11. Divide \$9003.75 by \$3.75. *Ans.* 2401.
12. Divide \$276.00 by \$9.20. *Ans.* 30.

13. If 63 acres of land cost \$7938, what will 1 acre cost? *Ans.* \$126.

14. If 516 chairs cost \$2012.40, what will 1 chair cost? *Ans.* \$3.90

15. How much a head will I pay for sheep, if 280 cost \$840.00? *Ans.* \$3.00.

16. What is the price of butter per pound, when 300 pounds cost \$105? *Ans.* 35*c.*

17. At \$9.25 a ton, how many tons of coal can be purchased for \$120.25? *Ans.* 13 *tons.*

18. How many baskets of peaches can be bought for \$6, at the rate of 25 cents per basket?

Ans. 24 *baskets.*

19. Bought a barrel of vinegar for \$13.23, at the rate of 21 cents a gallon; how many gallons in the barrel? *Ans.* 63 *gals.*

20. How much does a laborer receive per day, if for 42 days, he earn \$56.70? *Ans.* \$1.35.

21. At \$7 a barrel, how many barrels of flour can be bought for \$273? *Ans.* 39 *bbl.*

22. How many yards of cloth can be purchased for \$633.50 at \$3.62 per yard? *Ans.* 175 *yds.*

WRITTEN EXERCISES.

Divide :

1. 468 by 2.
2. 678 by 6.
3. 525 by 7.
4. 192 by 8.
5. 504 by 9.
6. 455 by 5.
7. 792 by 8.
8. 843 by 3.
9. 4080 by 4.
10. 3961 by 12.
11. 4802 by 14.
12. 39623 by 61.
13. 41693 by 36.
14. 35021 by 70.
15. 49680 by 35.
16. 185952 by 20.
17. 18284 by 28.
18. 16967 by 47.
19. 96720 by 104.
20. 8352 by 427.
21. 6531 by 307.
22. 18538 by 806.
23. 32445 by 45.
24. 4962 by 21.
25. 89322 by 756.
26. 4821 by 73.
27. 34476 by 68.
28. 53084 by 831.
29. 41097 by 57.
30. 57353 by 83.
31. 9845 by 67.
32. 21344 by 392.
33. 26000 by 208.
34. 8232 by 147.
35. 25830 by 246.
36. 1661443 by 5789.
37. 72072 by 572.
38. 831465 by 6883.
39. 91645 by 791.
40. 93984 by 356.
41. 95648 by 98.
42. 212602 by 5746.
43. 255645 by 6555.
44. 8430 by 1405.
45. 15341 by 529.
46. 3456 by 27.
47. 109440 by 608.
48. 72134 by 329.
49. 456203 by 856,
50. 9624 by 72.
51. 56396 by 184.

INTRODUCTORY FRACTIONS.

:o:

1 unit = 2/2

50. If a unit is divided into two equal parts, one of the parts is called one half.

1 unit = 3/3

If the unit is divided into three equal parts, one of the parts is called one third; two of the parts are called two thirds.

1 unit = 4/4

If the unit is divided into four equal parts, one of the parts is called one fourth; two of the parts are called two fourths, and three, three fourths.

ORAL EXERCISES.

I.

1. How many halves in a unit? in 2 units? in 3 units? in 4 units? in 6 units?

2. How many thirds in a unit? in 2 units? in 3 units? in 5 units? in 8 units?

3. How many fourths in a unit? in 2 units? in 4 units? in 10 units?

4. How many halves in a unit and a half? in 2 units and a half? in 3 units and a half?

5. How many thirds in 3 units and a third? in 5 units and two thirds?

II.

1. Find $\frac{1}{2}$ of 4, $\frac{3}{4}$ of 8.

SOLUTION.—To find $\frac{1}{2}$ of any number divide that number by 2. Thus, $\frac{1}{2}$ of $4 = 4 \div 2 = 2$ *Ans.*

II. $\frac{3}{4}$ of 8 = 3 times $\frac{1}{4}$ of 8. Since $\frac{1}{4}$ of $8 = 8 \div 4$, therefore $\frac{3}{4}$ of $8 = (8 \div 4) \times 3 = 6$ *Ans.*

2. What is $\frac{1}{2}$ of 6? of 10? of 14? of 20? of 24? of 30? of 50?

3. What is $\frac{1}{3}$ of 9? of 12? of 15? of 18? of 24? of 30? of 75?

4. What is $\frac{1}{4}$ of 12? of 16? of 24? of 36? of 48? of 160? of 200?

5. What is $\frac{2}{3}$ of 9? of 12? of 18? of 21? of 60? of 90? of 120? of 300?

6. What is $\frac{3}{4}$ of 12? of 16? of 20? of 28? of 36? of 100? of 400?

7. At 20 cents a pound for honey, what must you pay for half a pound?

8. When coal is worth 8 dollars a ton, what must be paid for $\frac{1}{4}$ of a ton?

9. If there are 12 ounces in a pound, how many ounces in $\frac{2}{3}$ of a pound?

10. If there are 100 cents in a dollar, how many cents in $\frac{3}{4}$ of a dollar?

WRITTEN EXERCISES.

1. What will $72\frac{1}{2}$ yards of silk cost at $4 a yard?

SOLUTION.—If one yard cost $4, $72\frac{1}{2}$ yards will cost $72\frac{1}{2}$ times $4. 72 times $4 = $288; and $\frac{1}{2}$ of $4 = $2. Hence $72\frac{1}{2}$ yards will cost $288+$2.=$290 *Ans.*

2. At 30 cents a pound what will $8\frac{2}{3}$ pounds of tea cost?

3. If a man pay $22\frac{1}{2}$ cents a pound for beef, what will 50 pounds cost him?

4. When raisins are worth $\frac{2}{3}$ of a dollar a box, what will 135 boxes cost?

5. What must a grocer pay for 36 bushels of potatoes at $62\frac{1}{2}$ cents a bushel?

6. What will 52 pounds of sugar cost at $11\frac{3}{4}$ cents a pound?

7. A man having $900, spent $\frac{2}{3}$ of it. How much had he left?

8. What cost 1297 dozen of eggs at $16\frac{1}{2}$ cents a dozen? *Ans.* $214.005.

9. At $6\frac{1}{4}$ cents a spool, what cost 9245 spools of thread? *Ans.* $577.8125.

10. What cost 7842 yards of muslin at $33\frac{1}{3}$ cents a yard? *Ans.* $2614.

11. What is the cost of 525 pounds of sugar at $12\frac{1}{2}$ cents a pound? *Ans.* $65.625.

12. Find the cost of 2500 melons at 25 cents each? *Ans.* $625.

13. What must be paid for 6 bales of cotton, containing 420 pounds each, at $16\frac{2}{3}$ cents a pound? *Ans.* $420.

14. What will 18 pieces of calico, each containing 45 yards, cost at 25 cents a yard? *Ans.* $202.50.

15. If a wheel turn 480 times in going a mile, how many times will it turn in going $\frac{5}{8}$ of a mile? *Ans.* 300.

16. At $2\frac{3}{4}$ a yard what will be the cost of 240 yards of silk? *Ans.* $660.

17. If a boy can write 50 pages in a week, how many pages can he write in $\frac{3}{5}$ of a week? *Ans.* 30.

18. A boy sold $9\frac{1}{4}$ dozen of eggs at 4 cents a piece. He received in payment $6\frac{1}{2}$ pounds of butter at 20 cents a pound, and $12\frac{2}{3}$ yards of ribbon at 3 cents a yard. How much is still due him?

TABLES.

———:o:———

Federal Money.

10 mills	make	1 cent, ...	marked	ct.
10 cents	"	1 dime, ...	"	d.
10 dimes	"	1 dollar, ...	"	$
10 dollars	"	1 eagle, ...	"	E.

ORAL EXERCISES.

1. How many mills in a cent? in 2 cents? in 4 cents? in 6 cents? in 8 cents? in 14 cents?

2. How many cents in a dime? in 3 dimes? in 5 dimes? in 9 dimes?

3. How many dimes in a dollar? in 12 dollars? in 16 dollars? in 20 dollars?

4. How many cents in 2 dollars? in 7 dimes? in 5 dimes?

5. How many mills in 5 cents? dimes in 3 dollars? cents in 6 dimes?

6. How many dollars in 4 eagles? in 7 eagles? in 12 eagles?

7. How many cents in 60 mills? in 80 mills? in 50 mills? in 30 mills?

8. How many cents and mills in 75 mills? in 86 mills? in 37 mills? in 98 mills?

9. How many dimes and cents in 56 cents? in 63 cents? in 82 cents?

10. How many eagles and dollars in 36 dollars? in 49 dollars? in 72 dollars?

English or Sterling Money.

4 farthings,	far.,	make 1	penny, marked	d.
12 pence		" 1	shilling, "	s.
20 shillings		" 1	pound, "	£.
21 shillings		" 1	guinea. "	

ORAL EXERCISES.

1. How many farthings in a penny? in 3 pence? in 7 pence? in 9 pence?

2. How many pence in a shilling? in 4 shillings? in 8 shillings?

3. How many shillings in a pound? in 5 pounds? in 6 pounds? in 10 pounds?

4. How many shillings in a guinea? in 6 guineas? in 10 guineas?

5. How many farthings in 7d. and 3far.? in 8d. and 2far.?

6. How many shillings in £4. and 5s.? in £10. and 12s.?

7. How many d. in 9s. 8d.? in 12s. 6d.?

8. How many pence in 20 farthings? in 48 farthings?

9. How many s. in 36d.? in 72 pence? in 96d.? in 144 pence?

10. How many £ and s. in 25 shillings? in 68 shillings? in 146 shillings?

Troy Weight.

The denominations of Troy Weight are pounds, ounces, pennyweights, and grains.

Gold, silver, jewels, and liquors are weighed by Troy Weight.

24 grains, gr., make 1 pennyweight, marked dwt.
20 pennyweights " 1 ounce, " oz.
12 ounces " 1 pound, " lb.
The pound Troy contains 5,760 grains.

ORAL EXERCISES.

1. How many grains in a pennyweight? in 3 pennyweights? in 6 dwt.?

2. How many dwt. in an ounce? in 5 oz.? in 8 oz.? in 10 oz.?

3. How many ounces in a pound? in 4 lbs.? in 7 lbs.? in 9 lbs.? in 12 pounds?

4. How many pennyweights in 72 grains? in 96 grains? in 144 grains?

5. How many ounces in 40 dwt.? in 80 dwt.? in 100 dwt.?

6. How many pounds in 36 ounces? in 60 oz.? 96 oz.? in 108 oz.?

7. How many dwt. and grs. in 49 grains? in 80 grs.? in 100 grs.?

8. How many pounds and ounces in 27 oz.? in 63 oz.? in 89 oz.?

9. How many dwt. in 4 oz. and 3 dwt.? in 7 oz. 5 dwt.?

10 How many ounces in 6 pounds and 7 oz.? in 8 lbs. 3 oz.? in 5 lbs. 9 oz.?

Avoirdupois Weight.

Avoirdupois Weight is used to weigh all common goods, such as groceries, hay, grain, and all metals, except gold and silver.

The denominations of Avoirdupois Weight are tons, hundredweights, quarters, pounds, ounces, and drams.

16 drams, dr,	make	1 ounce, marked	oz.
16 ounces	"	1 pound, "	lb.
25 pounds	"	1 quarter, "	qr.
4 quarters	"	1 hundredweight,	cwt.
20 hundredweight	"	1 ton,	T.

The pound Avoirdupois contains 7,000 grains.

ORAL EXERCISES.

1. How many ounces in a pound? in 4 pounds? in 8 pounds? in 10 pounds?

2. How many lbs. in 2 cwt.? in 7 cwt.? in 9 cwt.?

3. How many cwt. in a ton? in 6 tons? in 9 T.? in 12 T.?

4. How many onnces in 3 pounds? in a hundredweight? in a ton?

5. How many pounds in 32 ounces? in 64 oz.? in 128 oz.? in 144 oz.?

6. How many cwt. and lbs. in 120 lbs.? in 260 lbs.? in 340 lbs.?

7. How many pounds and ounces in 39 ounces? in 84 oz.? in 90 oz.?

8. How many ounces in 5 lbs. 11 oz..? in 4 lbs. 12 oz.? in 10 lbs. 3 oz.?

9. How many lbs. in 6 cwt. 25 lbs.? in 7 cwt. 36 lbs.?

10. How many tons and hundredweight in 45 cwt.? in 92 cwt.? in 130 cwt.?

Apothecaries' Weight.

This weight is used by apothecaries and physicians in mixing their medicines. But medicines are generally sold, in the quantity, by avoirdupois weight.

Its denominations are pounds, ounces, drams, scruples, and grains.

20 grains,	gr.,	make 1 scruple,	marked	sc.
3 scruples	"	1 dram,	"	dr.
8 drams	"	1 ounce	"	oz.
12 ounces	"	1 pound	"	lb.

ORAL EXERCISES.

1. How many grains in a scruple? in 2 scruples? in 5 scruples? in 7 sc.?

2. How many sc. in a dram? in 6 dr.? in 9 dr.? in 20 dr.?

3. How many sc. in 40 grs.? in 90 grs.? in 120 grs.? in 140 grs.?

4. How many drams in an ounce? in 5 oz. in 8 oz.? in 15 oz.?

5. How many drams in 9 sc.? in 15 sc.? in 36 sc.? in 51 sc.?

6. How many ounces in 24 dr.? in 48 dr.? in 64 dr.? in 96 dr.?

7. How many ounces in a pound? in 3 pounds? in 5 pounds? in 15 pounds? in 20 pounds?

8. How many pounds in 48 oz.? in 108 oz.? in 240 oz.?

9. How many sc. in an oz.? in a lb.? in 1 lb. 6 oz.?

10. How many grains in a dram? scruples in 4 drams? drams in 5 lbs.?

Wine Measure.

Wine Measure is used for measuring all liquids, except ale, beer, and milk.

The denominations of Wine Measure are tuns, pipes, hogsheads, tierces, barrels, gallons, quarts, pints, and gills.

4 gills, gi.,	make	1	pint,	marked	pt.
2 pints	"	1	quart,	"	qt.
4 quarts	"	1	gallon,	"	gal.
31½ gallons	"	1	barrel,	"	bbl.
42 gallons	"	1	tierce,	"	tier.
63 gallons	"	1	hogshead	"	hhd.
2 hogsheads	"	1	pipe,	"	pi.
2 pipes	"	1	tun,	"	tun.

The gallon of Wine Measure in the United States contains 231 cubic inches, and is equal to 8.339 Avoirdupois lbs. of distilled water, very nearly.

The English imperial wine gallon contains 277.274 cubic inches, and hence is equal to 1.2 times the wine gallon of the United States.

ORAL EXERCISES.

1. How many gills in a pint? in 4 pints? in 6 pints? in 12 pts.? in 20 pts.?

2. How many pts. in a qt.? in 6 qts.? in 8 qts.? in 15 qts.?

3. How many gallons in a barrel? in a tierce? in a hogshead? in a pipe? in a tun?

4. How many pints in 12 gills? in 26 gi.? in 37 gi.? in 50 gi.?

5. How many quarts in 10 pts.? in 24 pts.? in 50 pts.? in 84 pts.?

6. How many gallons in 1 hhd. 10 gals.? in 2 bbls. 15 gals.?

7. How many quarts in a barrel? pints in 2 gallons? gills in 6 quarts?

8. How many gallons in 72 quarts? in 104 qts.? in 4 bbls. 4 gals.?

9. How many pts. and gi. in 18 gi.? in 31 gi.? in 53 gi.? in 74 gi.?

10. How many hogsheads in 6 tuns? pints in 8 gals.? gallons in 3 pipes?

Ale or Beer Measure.

By this measure ale, beer, porter, and milk are measured.

The denominations of Beer Measure are hogsheads, barrels, gallons, quarts, and pints.

2 pints, pt.,	make 1 quart,	marked	qt.
4 quarts	" 1 gallon,	"	gal.
36 gallons	" 1 barrel,	"	bbl.
1½ barrel or 54 gals.	" 1 hogshead,	"	hhd.

ORAL EXERCISES.

1. How many pints in a quart? in 3 qts.? in 8 qts.? in 12 qts.?

2. How many qts. in a gallon? in 5 gals.? in 7 gals.? in 22 gals.?

3. How many gallons in a barrel? in 3 barrels? in 5 barrels? in 8 barrels?

4. How many gallons in a hogshead? in 2 hhds.? in 4 hhds.?

5. How many qts. in 10 pts.? in 19 pts.? in 31 pts.? in 56 pts.?

6. How many gallons in 11 qts.? in 32 qts.? in 2 bbls. 2 qts.?

7. How many qts. and pts. in 17 pts.? in 73 pts.? in 85 pints?

8. How many barrels and gallons in 75 gallons? in 110 gallons?

9. How many gallons in 2 bbls. 5 gals.? in 2 hhds. 8 gals?

10. How many quarts in 18 pints? gallons in 68 qts.? barrels in 144 gals.?

Cloth Measure.

Cloth Measure is used for measuring goods sold by the yard. Its denominations are ells, yards, quarters, nails and inches.

2¼ inches,	in.,	make 1	nail,	marked na.
4 nails		" 1	quarter,	" qr.
4 quarters		" 1	yard	" yd.
3 quarters		" 1	Flemish ell,	" Fl. e.
5 quarters		" 1	English ell,	" E. e.
6 quarters		" 1	French ell,	" Fr. e.

ORAL EXERCISES.

1. How many inches in a nail? in 4 nails? in 6 nails? in 8 nails? in 10 nails?

2. How many nails in a qr.? in 5 qrs.? in 6 qrs.? in 12 qrs.? in 20 qrs.?

3. How many qrs in a Fl. e.? in 5 Fl. e.? in 10 Fl.e.? in 15 Fl. e.?

4. How qrs. in an E. e.? in 8 E. e.? in 30 E e.? in 50 E. e.?

5. How many quarters in a Fr. e.? in 9 Fr. e.? in 25 Fr. e.? in 40 Fr. e.?

6. How many yds. in 20 qrs.? in 56 qrs.? in 96 qrs.? in 124 qrs.?

7. How many quarters in 7 Fr. e. and 5 qrs.? in 9 E. e. and 2 qrs.?

8. How many English ells in 25 qrs.? in 30 qrs.? in 65 qrs.?

9. How many nails in 3 Fl. e.? in 6 Fr. e.? in 8 E. e.?

10. How many quarters in 5 yds. and 2 qrs.? nails in 7 qrs. and 3 nails? inches in 2 Fr. e.?

Long Measure.

Long Measure is used for measuring length without regard to breadth or depth.

Its denominations are circles, degrees, leagues, miles, furlongs, rods, poles, or perches, yards, feet, inches, and barleycorns.

3 barleycorns, b. c..	make	1 inch,	marked in.
12 inches	"	1 foot,	" ft.
3 feet	"	1 yard,	" yd.
5½ yards, or 16½ feet,	"	1 rod, pole or perch,	" rd.
40 rods	"	1 furlong,	" fur.
8 furlongs	"	1 mile,	" m.
3 miles	"	1 league,	" lea.
69⅓ statute miles	"	1 degree,	" deg.
60 geographical miles	"	1 degree,	" deg.
360 degrees	"	1 circle,	" cir.

ORAL EXERCISES.

1. How many barley corns in an inch? in 3 inches? in 10 inches? in 20 inches?

2. How many inches in a foot? in 4 ft.? in 6 ft.? in 9 ft.? in 15 ft.?

3. How many feet in 36 inches? in 48 inches? in 72 inches? in 96 inches?

4. How many feet in a yard? in 3 yds.? in 5 yds.? in 8 yds.? in 12 yds.?

5. How many yards in 18 ft.? in 24 ft.? in 57 ft.? in 63 ft.?

6. How many feet and inches in 26 inches? in 39 in.? in 56 in.? in 75 in.?

7. How many yards and feet in 14 feet? in 29 ft.? in 49 ft.? in 62 ft.?

8. How many furlongs in 12 miles? leagues in 21 miles? degrees in 360 geographical miles?

9. How many rods in 2 miles? in 3 leagues? in 15 furlongs? in 1 mile and 4 furlongs?

10. How many feet in 15 yds. 2 ft.? inches in 8 ft. 10 in.?

Square Measure.

This measure is used for measuring all kinds of surfaces, such as land, boards, plastering, and every thing else in which length and breadth only are considered.

Its denominations are square miles, acres, roods, square rods or poles, square yards, square feet, and square inches.

144 square inches make	1 square foot,	marked	sq. ft.
9 square feet "	1 square yard,	"	sq. yd.
30¼ square yards "	1 sq. rod or pole,	"	P.
40 sq. rds. or poles "	1 rood,	"	R.
4 roods "	1 acre,	"	A.
640 acres "	1 square mile,	"	Sq. M.

ORAL EXERCISES.

1. How many sq. in. in a sq. ft. ? in 4 sq. ft. ? in 6 sq. ft. ? in 8 sq. ft. ?

2. How many sq. ft. in 288 sq. in. ? in 720 sq. in. ? in 1008 sq. in. ?

3. How many sq. in. in 2 sq. ft. 12 sq. in. ? in 5 sq. ft. 80 sq. in. ?

4. How many sq. ft. in a sq. yd. ? in 12 sq. yds. ? in 20 sq. yds. ?

5. How many sq. yds. in 36 sq. ft. ? in 72 sq. ft. ? in 99 sq ft. ?

6. How many sq.ft. in 4 sq. yds. 7 sq. ft. ? in 7 sq. yds. 8 sq. ft. ?

7. How many sq. yds. in 5 sq.rds. ? in 7 sq. rds. ? in 10 sq. rds. ?

8. How many sq. rds. in 3 acres ? in 6 roods ? in 5 acres ?

9. How many acres in 2 sq. m. ? sq. yds. in 81 sq. ft. ? sq. rds. in 5 roods ?

10. How many sq. ft. in 5 sq. yds. 4 sq. ft. ? acres in 640 sq. rds. ? sq ft. in 720 sq.in. ?

Surveyors' Measure.

The Surveyor's or Gunter's chain is generally used in surveying land. It is 4 poles, or 66 feet, in length, and is divided into 100 links.

$7\frac{92}{100}$ inches, in.,	make	1 link,	marked li.
25 links	"	1 rod or pole,	" P.
4 poles, or 100 links	"	1 chain,	" cha.
10 chains	"	1 furlong	" fur.
8 fur. or 80 chains	"	1 mile	" M.
10 square chains	"	1 acre,	" A.

ORAL EXERCISES.

1. How many links in a rod? in 4 rds.? in 8 rods? in 10 rds.?

2. How many poles in a chain? in 3 chains? in 5 chains? in 20 chains?

3. How many chains in a furlong? in 4 furlongs? in 15 furlongs?

4. How many furlongs in a mile? in 12 miles? in 20 miles? in 30 miles?

5. How many square chains in an acre? in 7 acres? in 12 acres?

6. How many acres in 120 square chains? in 150 square chains? in 200 square chains?

7. How many links in 2 furlongs? chains in 2 acres? poles in one furlong?

8. How many chains in 5 furlongs and 6 chains? in 7 furlongs and 8 chains?

9. How many acres and chains in 37 square chains? in 86 square chains?

10. How many poles in 2 chains and 3 poles? in 6 chains and 2 poles?

Solid or Cubic Measure.

This is used for measuring solids, that is, things that have three dimensions, viz., length, breadth and depth or thickness ; as wood, timber, stone, masonry, etc.

1728 cubic inches, c. in.	make	1 cubic foot,	cu. ft.
27 cubic feet	"	1 cubic yard,	cu. yd.
40 cubic feet round timber	"	1 ton,	T.
42 cubic feet of shipping	"	1 ton,	T.
50 cubic feet hewn timber	"	1 ton,	T.
16 cubic feet,	"	1 cord foot,	c. ft.
8 cord feet or 128 cubic ft.,	"	1 cord of wood,	C.

ORAL EXERCISES.

1. How many cubic inches in a cubic foot ? in 2 cu. ft. ? in 3 cu. ft. ?

2. How many cu. ft. in a cu. yd. ? in 3 cu. yds. ? in 10 cu. yds. ?

3. How many cu. ft. in 2 cord feet? in 10 cords of wood ?

4. How many cubic feet hewn timber in a ton? in 3 tons ? in 4 tons ?

5. How many cu. ft. of round timber in a ton? in 5 tons ? in 6 tons ?

6. How many cord feet in a cord of wood ? in 3 cords ? in 12 cords ?

7. How many cu. ft. of shipping in a ton ? in 2 tons ? in 4 tons ?

8. How many cord feet in 48 cu. ft. ? in 64 cu. ft. ? in 96 cu. ft. ?

9. How many cu. yds. and cu. ft. in 63 cu. ft. ? in 85 cu. ft. ?

10. How many cords of wood in 256 cu. ft. ? in 56 cu. ft. ?

Dry Measure.

This is used in measuring all dry articles, such as grain, fruit, salt, coal, etc.

The denominations are loads, quarters, chaldrons, bushels, pecks, quarts, and pints.

2 pints, pt.,	make	1 quart,	marked	qt.
4 quarts	"	1 gallon,	"	gal.
8 quarts	"	1 peck,	"	pk.
4 pecks	"	1 bushel,	"	bu.
36 bushels	"	1 chaldron,	"	ch.
8 bushels	"	1 quarter,	"	qr.
5 quarters	"	1 load,	"	load.

The standard bushel of the United States is the Winchester bushel of England. It is a circular measure 18½ inches in diameter and 8 inches deep, and contains 2150.4 cubic inches nearly. It contains 77.6274 pounds avoirdupois of distilled water.

ORAL EXERCISES.

1. How many pints in a quart? quarts in a gallon? pecks in a bushel?

2. How many gallons in 16 quarts? bushels in 32 pecks? pecks in 56 quarts?

3. How many quarters in 24 bushels? in 72 bushels? in 80 bushels?

4. How many loads in 25 quarters? in 40 quarters? in 60 quarters?

5. How many quarts in a bushel? in 2 bu.? in 3 bu.? in 6 bu.?

6. How many pks. and qts. in 42 qts.? in 27 qts.? in 50 qts.? in 37 qts.?

7. How many pints in a peck? in 4 pks.? in 6 pks.? in 12 pks.? in 10 pks.?

8. How many quarts and pints in 17 pints? in 21 pts.? in 39 pts.? in 43 pts.?

9. How many gallons in 16 pints? in 48 pints? in 64 pts.? in 72 pts.? in 80 pts.?

10. How many quarters in 10 loads and 3 quarters? in 16 loads and 2 quarters? in 20 loads and 1 quarter?

Circular Measure.

Circular Measure is applied to the divisions of the circle, and is used in reckoning latitude and longitude and the motion of the heavenly bodies. It is often called Angular Measure, and is chiefly used by astronomers, navigators, and surveyors. Its denominations are circles, signs, degrees, minutes, and seconds.

60 seconds,	"	make 1 minute,	marked ′.
60 minutes	"	1 degree,	" °.
30 degrees	"	1 sign,	" s.
12 signs, or 360°,	"	1 circle,	" c.

ORAL EXERCISES.

1. How many seconds in a minute? in 3′? in 4′? in 6′?

2. How many minutes in 120 seconds? in 240″? in 360″? in 600″?

3. How many minutes and seconds in 245 seconds? in 195″? in 370″?

4. How many minutes in a degree? in 4°? in 8°? in 10°?

5. How many degrees in 300 minutes? in 420′? in 480′?

6. How many minutes in 5 degrees and 20 minutes? in 4° 15′? in 6° 35′?

7. How many degrees in a sign? in 4 s.? in 6 s.? in 9 s.? in 12 s.?

8. How many signs in 150 degrees? in 270°? in 540°? in 90°?

9. How many signs in a circle? in 6 c.? in 10 c.? in 16 c.? in 30 c.?

10. How many circles and signs in 26 signs? in 73 s.? in 63 s.? in 74 s.?

Distance—Depths—Heights.

4 inches make 1 hand, used for measuring the height of horses.
6 points " 1 line, for measuring length of pendulums for clocks.
12 lines " 1 inch, " " " " " "
5 feet " 1 geometrical pace, used for measuring distances.
6 feet " 1 fathom, for measuring depths at sea.
3 miles " 1 league, for measuring distances at sea.

ORAL EXERCISES.

1. How many inches in a hand? in 3 hands? in 8 hands? in 10 hands? in 20 hands?

2. How many points in a line? in 5 lines? in 15 lines? in 25 lines?

3. How many feet in a pace? in 8 paces? in 30 paces? in 10 paces? in 21 paces?

4. How many feet in a fathom? in 12 fathoms? in 20 fathoms? in 50 fathoms?

5. How many miles in a league? in 5 leagues? in 8 leagues? in 15 leagues? in 30 leagues?

6. How many lines in 24 points? in 18 points? in 48 points? in 30 points?

7. How many fathoms in 36 feet? in 66 feet? in 47 feet? in 108 feet?

8. How many paces in 35 feet? in 60 feet? in 75 feet? in 90 feet?

9. How many inches and lines in 47 lines? in 65 lines? in 78 lines? in 17 lines?

10. How many leagues and miles in 22 miles? in 34 miles? in 58 miles?

TIME.

This is reckoned by centuries, years, months, weeks, days, hours, minutes, and seconds.

60 seconds, sec.	make	1 minute,	marked m.
60 minutes	"	1 hour,	" h.
24 hours	"	1 day.	" d.
365 days	"	1 year,	" Y.
7 days	"	1 week.	" w.
4 weeks (com. reck'g)	"	1 month,	" mo.
52 weeks " "	"	1 year,	" Y.
30 days " "	"	1 month,	" mo.
12 months	"	1 year,	" Y.
100 years	"	1 century,	" C.

The following are the numbers of days in each month:

January, 31 days.	July, 31 days.
February, 28 days.	August, 31 days.
March, 31 days.	September, 30 days.
April, 30 days.	October, 31 days.
May, 31 days.	November, 30 days.
June, 30 days.	December, 31 days.

The days in each month are often expressed thus:—

Thirty days hath September, April, June, and November,
February hath twenty-eight, and thirty-one the others rate,
Except in leap-year, happening once in four,
When we give to February one day more.

A natural day has 24 hours.

A Lunar month has 4 weeks, or 28 days.

A Solar year has 365 days, 5 hours, 48 minutes, 48 seconds, nearly.

A Civil year has 12 calendar months, or 365 days.

A Julian year has 13 lunar months, 1 day, 9 hours, or 365¼ days.

ORAL EXERCISES.

1. How many seconds in a minute? in 2 min.? in 4 min.? in 8 min.? in 10 min.?

2. How many minutes in 360 seconds? in 120 seconds? in 240 seconds? in 720 sec.?

3. How many seconds in 4 minutes and 12 seconds? in 3 min. 15 sec.?

4. How many hours in 120 minutes? in 360 minutes? in 420 min.?

5. How many minutes in 3 hours? in 5 hrs.? in 8 hrs.? in 12 hrs.? in 30 hrs.?

6. How many hours in a day? in 3 ds.? in 6 ds.? in 9 ds.? in 12 ds.?

7. How many days in 3 weeks? months in 5 years? years in 3 centuries?

8. How many days in May? in August? in March? in January? in June?

9. How many years and months in 15 mos.? in 29 mos.? in 68 mos.? in 42 mos.?

10. How many weeks and days in 25 days? in 34 days? in 69 days?

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Books and Paper.

The terms folio, quarto, octavo, duodecimo, etc., indicate the number of leaves in which a sheet of paper is folded.

A sheet folded in two leaves is called a folio.
" " four " quarto, or 4to.
" " eight " octavo, or 8vo.
" " twelve " a 12mo.
" " sixteen " a 16mo.
" " eighteen " an 18mo.
" " twenty-four is a 24mo.
" " thirty-two " a 32mo.

24 sheets of paper make 1 quire.
20 quires " " 1 ream.
2 reams " " 1 bundle.
5 bundles " " 1 bale.

ORAL EXERCISES.

1. How many sheets of paper in a quire? in 2 quires? in 4 quires? in 6 quires?

2. How many quires in a ream? in 3 reams? in 6 reams? in 10 reams?

3. How many quires and sheets in 30 sheets? in 20 sheets? in 80 sheets?

4. How many reams and quires in 28 quires? in 44 quires? in 72 quires?

5. How many reams in a bundle? in 5 bundles? in 8 bundles? in 20 bundles?

6. How many bundles in a bale? in 7 bales? in 9 bales? in 25 bales?

7. How many bundles and reams in 9 reams? in 15 reams? in 37 reams?

8. How many bales and bundles in 19 bundles? in 32 bundles? in 53 bundles?

9. How many quires in 2 bales? sheets in 2 reams? quires in 4 bundles?

10. How many bundles, reams, and quires in 63 quires? in 189 quires?

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Miscellaneous Table.

12 units, or things,	make	1 dozen.
12 dozen	"	1 gross.
12 gross, or 144 doz.,	"	1 great gross.
20 things	"	1 score.
100 pounds	"	1 quintal of fish.
196 pounds	"	1 barrel of flour.
200 pounds	"	1 barrel of pork.
18 inches	"	1 cubit.
22 inches nearly,	,,	1 sacred cubit.
14 lbs. of iron or lead	"	1 stone.
21½ stones	"	1 pig.
8 pigs	"	1 fother.
7½ lbs.	"	1 gallon of train oil.
10½ lbs.	"	1 stone of wire.

14 lbs.	"	1 peck of salt.
56 lbs.	"	1 firkin of butter.
120 lbs.	"	1 fagot of steel.
200 lbs.	"	1 barrel of potash.
112 lbs.	"	1 barrel of raisins.
256 lbs.	"	1 barrel of soap.
200 lbs.	"	1 barrel of shad or salmon.
11 lbs.	"	1 gallon of molasses.
8 lbs.	"	1 stone of meat.
25 lbs.	"	1 tod.
94 lbs.	"	1 firkin of soap.
364 lbs.	"	1 sack.
30 gallons	"	1 barrel of fish.
32 gallons	"	1 barrel of cider.
32 gallons	"	1 barrel of herring, Engl.
7½ bushels	"	1 hogshead on shore.
8 bushels	"	1 hogshead at sea.
30 lbs.	"	1 bushel of oats.
46 lbs.	"	1 do. of buckweat or barley.
56 lbs.	"	1 do. of Indian corn or rye.
60 lbs.	"	1 do. of wheat.

ORAL EXERCISES.

1. How many dozen in a gross ? units in a dozen? things in 2 scores ?

2. How many pounds in a barrel of flour? in a bbl. of pork ? in a bbl. of raisins ?

3. How many pounds in 2 gallons of molasses ? in 3 stones of lead ? in 5 stones of meat ?

4. How many pounds in a firkin of soap ? in a barrel of potash ? in a bbl. of shad ?

5. How many pounds in a bushel of wheat ? in 4 bu. of oats ? in 2 bu. of rye ?

6. How many dozen in a great gross ? inches in a cubit ? pounds in a peck of salt ?

7. How many gallons in a barrel of cider ? in a bbl. of fish ? in a bbl. of herring?

Table of Aliquot Parts.

Aliquot parts of Avoirdupois weight.

10 cwt.	= $\frac{1}{2}$ ton.	$12\frac{1}{2}$ lbs.	= $\frac{1}{2}$ qr.
5 "	= $\frac{1}{4}$ "	$6\frac{1}{4}$ "	= $\frac{1}{4}$ "
4 "	= $\frac{1}{5}$ "	$3\frac{1}{8}$ "	= $\frac{1}{8}$ "
2 "	= $\frac{1}{10}$ "	8 oz.	= $\frac{1}{2}$ lb.
1 "	= $\frac{1}{20}$ "	4 "	= $\frac{1}{4}$ "
2 qrs.	= $\frac{1}{2}$ cwt.	2 "	= $\frac{1}{8}$ "
1 "	= $\frac{1}{4}$ "	1 "	= $\frac{1}{16}$ "

Aliquot parts of time.

6 months	= $\frac{1}{2}$ year.	15 days,	= $\frac{1}{2}$ month
4 "	= $\frac{1}{3}$ "	10 "	= $\frac{1}{3}$ "
3 "	= $\frac{1}{4}$ "	6 "	= $\frac{1}{5}$ "
2 "	= $\frac{1}{6}$ "	5 "	= $\frac{1}{6}$ "
$1\frac{1}{2}$ "	= $\frac{1}{8}$ "	3 "	= $\frac{1}{10}$ "
$1\frac{1}{3}$ "	= $\frac{1}{9}$ "	2 "	= $\frac{1}{15}$ "
1 "	= $\frac{1}{12}$ "	1 "	= $\frac{1}{30}$ "

ORAL EXERCISES.

1. How many cwt. in $\frac{1}{2}$ of a ton? in $\frac{1}{4}$ of a ton? in $\frac{1}{10}$ of a ton? in $\frac{1}{20}$ of a ton?

2. How many lbs. in $\frac{1}{2}$ of a qr.? in $\frac{1}{4}$ of a qr.? in $\frac{1}{8}$ of a qr.?

3. How many ounces in $\frac{1}{2}$ of a lb.? in $\frac{1}{4}$ of a lb.? in $\frac{1}{16}$ of a lb.?

4. How many months in $\frac{1}{2}$ of a year? in $\frac{1}{3}$ of a year? in $\frac{1}{4}$ of a year?

5. How many months in $\frac{1}{8}$ of a year? in $\frac{1}{9}$ of a year? in $\frac{1}{12}$ of a year?

6. How many days in $\frac{1}{2}$ of month? in $\frac{1}{3}$ of a month? in $\frac{1}{5}$ of a month?

7. How many days in $\frac{1}{10}$ of a month? in $\frac{1}{15}$ of a month? in $\frac{1}{30}$ of a month?

Aliquot parts of American Money.

PARTS OF $1 IN NEW YORK CURRENCY.			PARTS OF $ 1 IN N. ENGLAND CURRENCY.		
50 cents	= 4s.	= $\frac{1}{2}$.	3 shil.	=	$\frac{1}{2}$.
33$\frac{1}{3}$ "	= 2s. 8d.	= $\frac{1}{3}$.	2 "	=	$\frac{1}{3}$.
25 "	= 2s.	= $\frac{1}{4}$.	1s. 6d.	=	$\frac{1}{4}$.
20 "	= 1s. 7$\frac{1}{2}$d.	= $\frac{1}{5}$.	1s.	=	$\frac{1}{6}$.
16$\frac{2}{3}$ "	= 1s. 4d.	= $\frac{1}{6}$.	9 pence	=	$\frac{1}{8}$.
12$\frac{1}{2}$ "	= 1s.	= $\frac{1}{8}$.	6 "	=	$\frac{1}{12}$.
8$\frac{1}{3}$ "	= 8d.	= $\frac{1}{12}$.	6 "	=	$\frac{1}{2}$s.
6$\frac{1}{4}$ "	= 6d.	= $\frac{1}{16}$.	4 "	=	$\frac{1}{3}$s.
4$\frac{1}{6}$ "	= 4d.	= $\frac{1}{24}$.	3 "	=	$\frac{1}{4}$s.
3$\frac{1}{8}$ "	= 3d.	= $\frac{1}{32}$.	2 "	=	$\frac{1}{6}$s.

Aliquot parts of Sterling Money.

10 shillings	=	£$\frac{1}{2}$.	6 pence	=	$\frac{1}{2}$ shil.
6s. 8d.	=	£$\frac{1}{3}$.	4 "	=	$\frac{1}{3}$ "
5 shillings	=	£$\frac{1}{4}$.	3 "	=	$\frac{1}{4}$ "
4 "	=	£$\frac{1}{5}$.	2 "	=	$\frac{1}{6}$ "
3s. 4d.	=	£$\frac{1}{6}$.	1$\frac{1}{2}$ "	=	$\frac{1}{8}$ "
2s. 6d.	=	£$\frac{1}{8}$.	1 "	=	$\frac{1}{12}$ "
2 shillings	=	£$\frac{1}{10}$.	2 farth's	=	$\frac{1}{2}$ penny.
1s. 8d.	=	£$\frac{1}{12}$.	1 "	=	$\frac{1}{4}$ "

ORAL EXERCISES.

1. How many cents in 4s.? in 2s.? in 1s. 4d.? in 8d.?

2. How many cents in 4d.? in 3d.? in 6d.? in 1s.?

3. How many shillings in $\$\frac{1}{2}$? in $\$\frac{1}{4}$? in $\$\frac{1}{6}$? in $\$\frac{1}{3}$?

4. How many pence in $\frac{1}{2}$s.? in $\frac{1}{4}$s.? in $\frac{1}{3}$s.? in $\frac{1}{6}$ s.?

5. How many shillings in £$\frac{1}{2}$? in £$\frac{1}{3}$? in £$\frac{1}{5}$? in £$\frac{1}{10}$? in £$\frac{1}{12}$?

6. How many farthings in $\frac{1}{2}$ of a penny in $\frac{1}{4}$ of a penny?

TABLE exhibiting the Number of Days from any Day of one Month to the same Day of any other Month in the same Year.

From any Day of	To the same Day											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
January	365	31	59	90	120	151	181	212	243	273	304	334
February	334	365	28	59	89	120	150	181	212	242	273	303
March	306	337	365	31	61	92	122	153	184	214	245	275
April	275	306	334	365	30	61	91	122	153	183	214	244
May	245	276	304	335	365	31	61	92	123	153	184	214
June	214	245	273	304	344	365	30	61	92	122	153	183
July	184	215	243	274	304	335	365	31	62	92	123	153
August	153	184	212	243	273	304	334	365	31	62	92	122
September	122	153	181	212	242	273	303	334	365	30	61	91
October	92	123	151	182	212	243	273	304	335	365	31	61
November	61	92	120	151	181	212	242	273	304	334	365	30
December	31	62	90	121	151	182	212	243	274	304	335	365

RULE *for finding the number of days between any given periods by table on opposite page.*

Find the first given month on the horizontal line in the left-hand column, and the other given month in the line at the top of the table, and to the number of days found at the intersection of the two lines add the difference between the days mentioned in the two given months.

NOTE.—It must be observed, however, that when the number of days given in the first-mentioned month is greater than the given number of days in the second month, then the difference of days must be subtracted from the number found at the intersection of the lines.

EXAMPLE 1.—How many days from March 16th to the 24th of the next July?

The number of days at the intersection of the lines is 122, and 24 — 16 = 8, the difference of days in the two given months.

Hence, 122 + 8 = 130 days.

EXAMPLE 2.—How many days from the 25th of June to the 18th of the next April?

The number of days at the intersection of the lines is 304, and 25 — 18 = 7, the difference of days of the given month.

Hence, 304 — 7 = 297 days.

3. How many days from May 15th to the 22d. of the next September?

4. How many days from August 6th. to the 18th. of the next October?

5. How many days from January 10th to the 14th of the next July?

WRITTEN EXERCISES.

1. How many pencils in a box containing 2 great gross ? *Ans.* 1728 *pencils.*

2. What cost 27 boxes of writing ink, each $2\frac{1}{2}$ dozen bottles at 9 cents a bottle ? *Ans.* $72.90.

3. How many reams of paper in 4678 sheets ?

Ans. 9 *reams,* 15 *quires,* 18 *sheets.*

4. What will 7 reams of legal cap cost at 35 cents a quire ? *Ans* $49.

5. What cost 9 boxes of fancy pen-holders each containing $\frac{1}{2}$ gross, at $2\frac{1}{2}$ cents a piece ? *Ans.* $16.20.

6. What cost 2 oz. of gold, if 3 dwt. cost $2.70 ?

7. What will 2 quarts of kerosene cost at 40 cents a gallon ?

8. What will 3 quarts of tomatoes cost at $1.20 a bushel ?

9. How many feet high is a horse 16 hands high ?

10. What is the difference between two square feet and two feet square ?

11. At 8 cents a peck, how many bushels of apples can be bought for $6.00 ?

12. If 25 lbs. of flour cost $1.25, what will 2 cwt cost ?

13. How many half-pint bottles may be filled from $2\frac{1}{2}$ gallon of wine ?

14. What will 7 quires of paper cost at $3.20 a ream ?

15. What will 8 eggs cost at 18 cents a dozen ?

16. If 6 oz of tea cost 36 cents, what will 3 lbs. cost ?

17. What will a gallon of molasses cost at 5 cents a pint ?

18. At 8 shillings a pair, how many pairs of shoes can be purchased for 2 sovereigns?

19. At what price must $\frac{1}{3}$ dozen of chairs, worth $15.00 a dozen, be sold in order to gain 50 cents a piece ?

20. How much will a peddler gain by selling 3 dozen combs worth 30 cents a dozen, at 5 cents a piece ?

21. What will $\frac{5}{8}$ of a lb. of candy cost at 2 cents an oz. ?

22. How many tablespoons each weighing 2 oz. can be made from 1 lb. 8 oz. of silver ?

23. How many leap years in a century ?

24. How many pills of 5 grains each can be made from $\frac{1}{2}$ an ounce of quinine ?

25. If a gallon of wine cost $5.00, what will 3 pts. cost ?

26. What will it cost to paint a ceiling 12 ft. by 29 ft, at 25 cents a square yard ?

27. How many yards of carpeting, a yard wide, will cover a floor 20 ft. long and 21 ft. wide ?

28. How many quarts of milk will a boy drink in a week, if he drink a pint a day ?

29. What is the weight in tons, &c. of 3 loads of potatoes, averaging 22 bu. each ; 1 load of wheat, 19 bu. ; and 4 loads of oats, each 25 bu. ? *Ans.* 4*t.* 3*cwt.*

30. What will it cost to ship 75 t. 8 cwt. 70 lbs. of freight at 6 cents a pound ? *Ans.* $9052.20.

31. How many farms of 75 acres each in a tract of land 6 miles long and 5 miles wide ? *Ans.* 256*farms.*

32. What is the height in feet of a horse $17\frac{1}{2}$ hands high ? *Ans.* 5*ft.* 10 *in.*