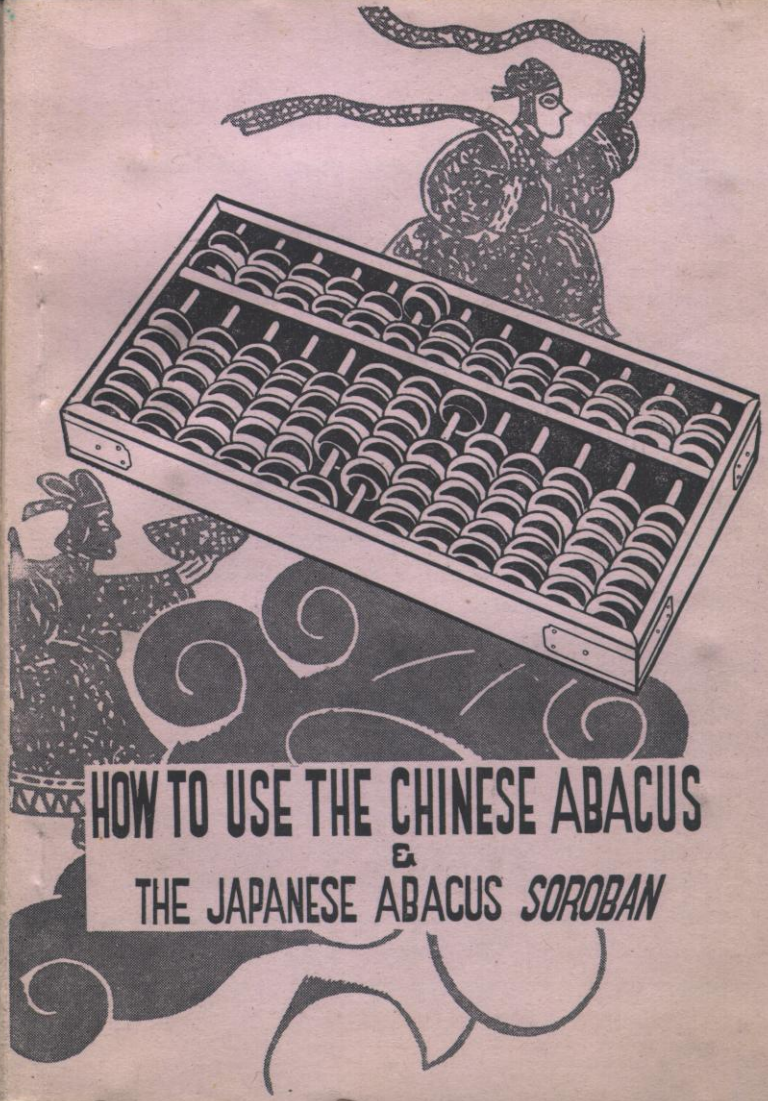


HOW TO USE THE CHINESE ABACUS

&

THE JAPANESE ABACUS *SOROBAN*

HOW TO USE THE CHINESE ABACUS

FOREWORD

The purpose of this booklet is to give only the fundamental operations of bead arithmetic by the Chinese abacus. *Bead Arithmetic* is a certain method of computation in which numbers are represented by wooden or, on some abacuses, plastic beads. These beads are systematically arranged on the set of rods fixed at right angles to the frames. The term *Bead Arithmetic* is used to distinguish it from the other form of arithmetic in which written figures are used. It may be rather an art of reckoning than arithmetic because its principle is not very much different from the idea of counting by use of some pieces of wood or bamboo as people did in ancient times.

The history of the abacus is very meagre. The writer could not find any record of who invented it nor of when this marvellously useful device made its first appearance.

Because of its great advantages, however, *Bead Arithmetic* is widely used in China, Japan, Egypt and other countries. For instance, in Japan, in almost every home "soroban" or the abacus is found; at almost every grammar school "soroban" is the essential subject; and, of course, in almost all the offices the abacus is used. Incidentally, the Japanese

abacus is a variation, with only a few minor modifications, of its Chinese counterpart. And this textbook is also fully serviceable to the student of the Japanese abacus if it is of the 5 or 6-bead type.

In Japan, the ability in the operation of the abacus is reckoned so important that they very often make it one of the necessary qualifications for business men. In fact, it may not be too much to say that you will find it very difficult to find any Japanese adult who cannot use "soroban" or the abacus.

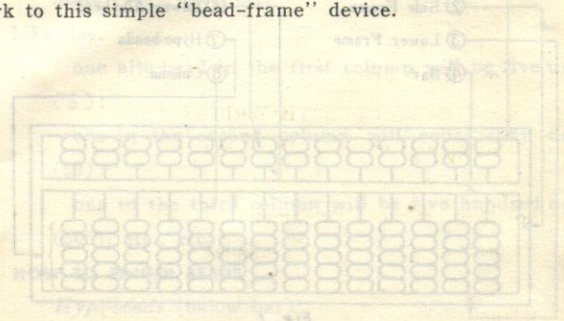
ADVANTAGES AND DISADVANTAGES OF BEAD ARITHMETIC AS COMPARED WITH WRITTEN ARITHMETIC

Upon comparison, both Bead and Written Arithmetics have their weak as well as their strong points. In solving complicated problems, Written Arithmetic is more serviceable, but for most of the daily business calculations, Bead Arithmetic is far better suitable. Its chief advantage over Written Arithmetic is the economy of time. This is especially true in addition and subtraction. A person trained in the use of the abacus can make calculations with amazing speed. In a contest in Tokyo, in 1947, a skilled abacus operator was matched against a person using a modern electric computer. The abacus won in problems involving addition and subtraction!

The abacus, in spite of its merits, is not without certain disadvantages. With an unskilled operator, it is liable to

error because beads are apt to be moved out of place inadvertently. But this can be avoided through carefulness and practice.

In a word, the merits of the abacus may be found in the fact that, while solving any problem in arithmetic needs two parts of our mental power, namely, the faculties of computation and memory, with the abacus we can devote our entire attention to accuracy in calculations and leave the memory work to this simple "bead-frame" device.



SECTION 1

GENERAL DIRECTIONS

1. NAMES OF THE PARTS OF THE ABACUS

For convenience, the parts of the Chinese abacus are to be named as follows:

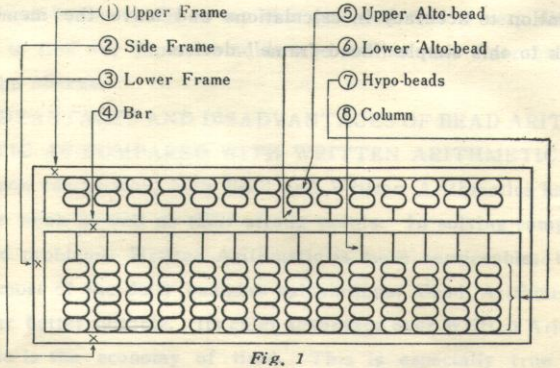


Fig. 1

Important: One alto-bead is equivalent to five hypo-beads.

2. HOW TO PLACE VALUE

The value of a bead depends upon which column you will choose as the unit's column. The beads in the left-hand column are always greater than those in the right-hand column. One unit in the left column is always ten times as large as one unit in the adjacent column to the

right.

Thus, if we assume that the first column from the right Side Frame is the unit's place,

one hypo-bead in the first column will be worth one unit (1);

one in the second column will be worth ten units (10);

one in the third column will equal one hundred units (100), etc., etc.

Likewise,

one alto-bead in the first column will be five units (5);

one in the second column will equal fifty units (50);

one in the third column will be five hundred units (500), etc., etc.

3. HOW TO FINGER BEADS

Hypo-beads (below bar)

These beads are to be moved by your thumb or index finger only. Use your thumb for moving UP, and your index finger for moving DOWN the bead. (See *Fig. 2*)

If the thumb and middle finger are employed to move the hypo-beads, then the index finger will be idle and apt to hit other beads out of place.

Alto-beads (above bar)

Only your middle finger should be employed to shift these beads both up- and downwards. (See *Fig.* 2)

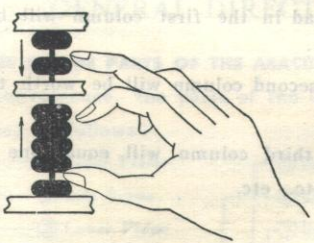


Fig. 2

Fig. 3

Fig. 2 also shows 9 units being represented by lowering one alto-bead by the middle finger and raising four hypo-beads by the thumb.

Fig. 3 indicates the 9 units as they are placed on the abacus.

4. HOW TO MAKE THE ABACUS READY FOR OPERATION

① Put your abacus on the desk in such way as the Lower Frame faces towards you.

② Let it stand on its Lower Frame.

③ Now all the Alto-beads have dropped on the bar and all the Hypo-beads on the Lower Frame.

④ Let it lie gently as it was with care so that the beads may not slide out of place.

⑤ With your abacus lying again on the desk, the last

thing to do before you can start operation is to place all the Alto-beads against the Upper Frame. This you can do quite easily by letting your middle finger slide horizontally from left to right between the Bar and the Lower Alto-beads. (See *Fig.* 4)

Now the abacus is ready for your use. You will always take these steps before you start calculations on your abacus.

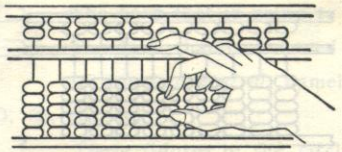


Fig. 4

5. DIFFERENT TYPES OF THE ABACUS

The Chinese abacus of which pictures you have seen in the previous pages of this booklet is of such type as it has seven movable beads in each ordinate column, namely two Alto-beads (Upper and Lower), and five Hypo-beads.

However, as you will find out later on, in the modern way of abacus calculations which this booklet intends to introdue, *it is not necessary to use the Upper Alto-bead, nor the lowest one of the Hypo-beads.* For inasmuch as one Alto-bead is equivalent to five Hypo-beads, instead of moving up the last (or lowest) Hypo-bead to make five, an Alto-bead may be used and the four Hypo-beads returned

to *neutral*, that is, against the Lower Frame. Similarly, as one Hypo-bead in the left Column equals two adjacent right-hand Alto-beads, instead of using the Upper Alto-bead to make ten, one Hypo-bead on the left Column may be used and the Lower Alto-bead returned to *neutral*.

The application of the latter principle is now found in the six-bead abacus which is widely used in Japan. (See *Fig. 5*)

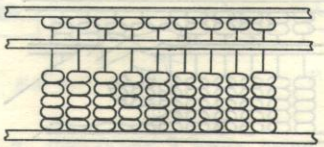


Fig. 5

There is still another type which contains only five beads in each Column, one above the Bar and four below it. (See *Fig. 6*) Apparently this is based on both of the aforesaid principles. This type of the abacus is also very popular in Japan and has been adopted as the standard type in most of the schools in the country.

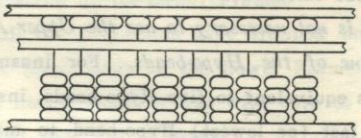


Fig. 6

Effort will be made in this booklet, therefore, so that the illusrations of operation may be serviceable to the user of any of the above three types of the abacus.

6. RULES OF SYMBOLS USED IN THE ILLUSTRATIONS OF OPERATION

A. ↑ ·····Move up a bead or beads.

B. ↓ ·····Move down a bead or beads.

C. ●·····The bead that has already been placed.

D. ○·····The bead that is going to be placed.

E. ⊖·····The bead that is assumed to have been returned to *neutral*, namely *cancelled*.

F. ①, ②, ③, etc.
These figures in the circle indicate the order in which operations are to be made.

Which Column may be used as the unit's?

Actually you can make any Column the unit's. But it is advisable to decide on your unit's Column according to how many figures you will need. If a number of many figures are to be represented, it will be necessary to choose, as the unit's, one of the Columns close to the right Side Frame.

The following illustrations show how to represent various numbers by the beads of the abacus. Note the order of operation carefully.

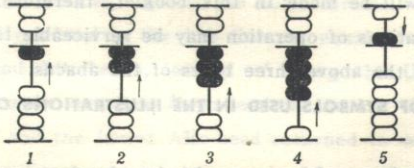


Fig. 7

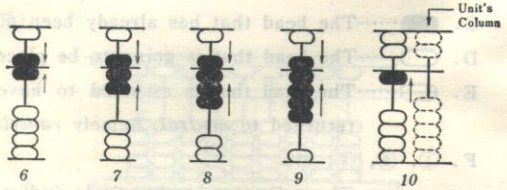


Fig.

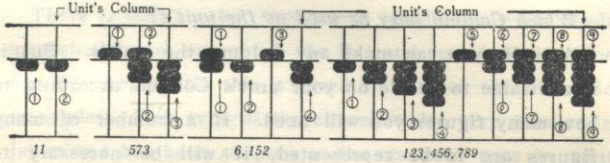


Fig.

Notes: In *Fig. 9* the beads that are not to be used are omitted.

SECTION 2

ADDITION

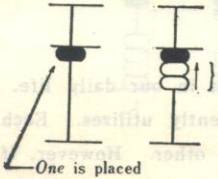
Among all the processes of calculation in our daily life, addition is the one that we most frequently utilizes. Each day we add up figures in some way or other. However, if you make use of and get skilled in the abacus, you will be able to do your addition with higher accuracy as well as with greater ease.

Explanation for the process will be made in the following few pages, taking advantage, wherever possible, of the illustration in addition to words and numbers. It is strongly recommended that the beginner will take his time in dealing with each illustrated operation and keep repeating it until he is completely satisfied. Then he will gradually speed it up until he can do almost automatically a certain operation he has started practising. His motto should always be "Accuracy First."

Note that in the following illustrations the beads that are not used in operation are omitted just to avoid confusion.

Illustration ①

a. 1+2=3

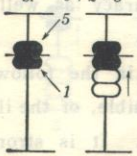


One is placed

Two beads are moved up with the thumb to add *two* to one.

Now you have the sum *three*

b. 6+2=8



Two beads are pushed up with the thumb to put *two*.

Here you have the answer *eight*

Six is placed with the thumb and the middle finger.

Exercises

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

Illustration ②

1+5=6

Exercises

2 + 5 = 7

3 + 5 = 8

4 + 5 = 9

Illustration ③

1+6=7

Put down the Alto-bead with the middle finger.

Put up the second Hypo-bead with the thumb.

All this should be done in one action.

Exercises

1 + 7 = 8

1 + 8 = 9

2 + 6 = 8

2 + 7 = 9

3 + 6 = 9

Illustration ④

2+3=5

Lower *five*

Cancel *two*

Exercises

1 + 4 = 5 (Lower 5, Cancel 1)

3 + 2 = 5 (Lower 5, Cancel 3)

4 + 1 = 5 (Lower 5, Cancel 4)

Illustration ⑤

3+3=6

Lower *five*

Cancel *two* of the three.

Exercises

3 + 4 = 7 (Lower 5, Cancel 1)

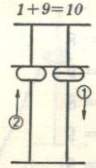
4 + 2 = 6 (Lower 5, Cancel 3)

4 + 3 = 7 (Lower 5, Cancel 2)

4 + 4 = 8 (Lower 5, Cancel 1)

2 + 4 = 6 (Lower 5, Cancel 1)

Illustration ⑥

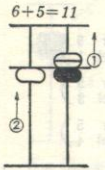


Cancel the originally placed *one* with the index finger, and then move up the first (=uppermost) Hypo-bead on the adjacent left-hand side Column to represent *ten*.

Exercises

$2+8=10$ (Cancel 2, Raise 10)
$3+7=10$ (Cancel 3, Raise 10)
$4+6=10$ (Cancel 4, Raise 10)

Illustration ⑦

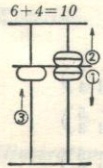


Return *five* with the middle finger of the originally placed *x*, and then raise *ten* (namely, the first Hypo-bead on the adjacent Column).

Exercises

$7+5=12$
$8+5=13$
$9+5=14$

Illustration ⑧

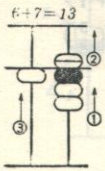


Cancel *six*. (First return *one* and then cancel *five*). Raise *ten*.

Exercises

$9+1=10$
$7+3=10$
$8+2=10$

Illustration ⑨

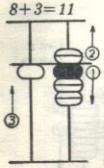


Raise *two* with the thumb.
Return *five* with the middle finger
Then, raise *ten*.

Exercises

$6+5=11$
$6+8=14$
$7+5=12$
$7+6=13$
$7+7=14$
$5+9=14$

Illustration ⑩



Cancel *seven*.
(See *illustration* ⑧)
Forward *ten*.

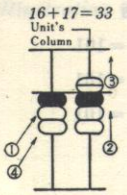
Exercises

$8+4=12$
$7+4=11$
$6+9=15$
$9+4=13$
$9+3=12$
$9+2=11$

If you master all these key operations shown by the Illustrations from ① to ⑩, you will no doubt be able to find on the abacus the sum of any numbers by means of simply combining the keys that have just been given to you.

Nevertheless, a few more illustrations will be given to show how to add numbers having more than two figures as in *16+17=33* or *354+1,447=1,801*. In the following illustrations, you will notice one distinction between the abacus arithmetic and the written one. Namely, in pen arithmetic, you begin to add at the right-hand figures, but, on the contrary, in the abacus arithmetic we start at the left-hand figures.

Illustration ⑪



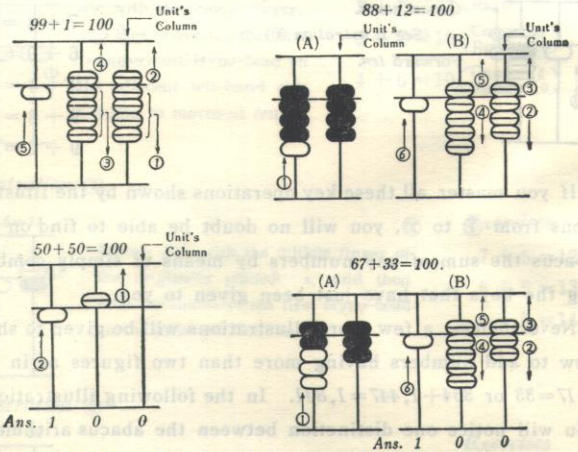
First place 16 on the abacus.
To add 17 to this, proceed as follows:

① Raise 10 on the second Column.
② Raise 2 on the first Column.
③ Cancel 5 on the first Column.
④ Raise another 0 on the second Column.

Exercises

$13+14=27$
$21+16=37$

Illustration ⑫

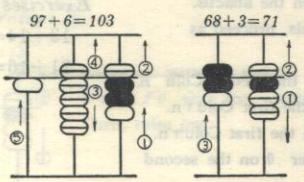


Exercises

23+77=100　　14+86=100

46+54=100　　60+40=100

Illustration ⑬



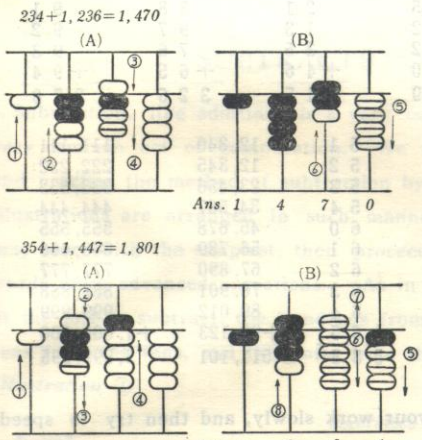
Exercises

92+ 9 =101

95+ 6 =101

98+ 3 =101

Illustration ⑭



Exercises

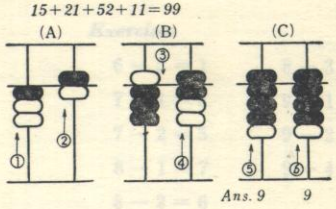
456+1, 678=2, 134

567+1, 784=2, 351

678+1, 895=2, 573

So far we have been working on the addition of two numbers. Given below are the illustrations and exercises for adding more than three numbers.

Illustration ⑮



Exercises

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

3 6	3 0	5 1	12,340	111,111
5 3	3 1	5 2	12,345	222,222
6 5	3 2	5 3	23,456	333,333
3 8	3 3	5 4	34,567	444,444
5 7	3 4	6 0	45,678	555,555
3 5	4 3	6 1	56,789	666,666
6 4	4 4	6 2	67,890	777,777
4 1	4 5	6 3	78,901	888,888
6 2	4 6	6 4	89,012	999,999
+4 9	+4 7	+6 5	+90,123	+1,000,000
5 0 0	3 8 5	5 8 5	511,101	5,999,995

At the outset do your work slowly, and then try to speed up. Repeat the same operation as many times as necessary until you are able to add accurately and rapidly.

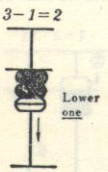
You have now a full knowledge of addition by the abacus and it is recommended that you will test it in the problems of your own choice.

SECTION 3

SUBTRACTION

Subtraction, like addition, is a very important and yet a very common act of computation. We shall now consider and practise the method of subtraction by the abacus. The illustrations are arranged in such manner that the reader may start with the simplest, then proceed step by step towards more advanced operations. As in addition, we begin at the left to subtract, the hundreds from the hundreds, the tens from the tens, and the units from the units.

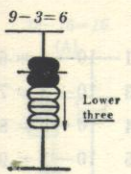
Illustration ①



Exercises

2 − 1 = 1
3 − 2 = 1
4 − 1 = 3
4 − 2 = 2
4 − 3 = 1

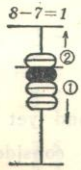
Illustration ②



Exercises

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

Illustration ③

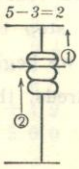


Lower 2 first.
Then cancel 5.

Exercises

6 − 5 = 1	9 − 7 = 2
7 − 6 = 1	9 − 8 = 1
8 − 6 = 2	
9 − 6 = 3	

Illustration ④

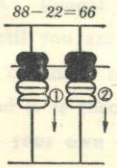


Cancel 5 first.
Then raise 2.

Exercises

5 − 1 = 4
5 − 2 = 3
5 − 4 = 1

Illustration ⑤



Exercises

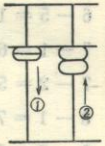
66−11=55
77−11=66
88−22=66
88−33=55

Illustration ⑥

Exercises

6 − 4 = 2
6 − 3 = 3
7 − 3 = 4
7 − 4 = 3

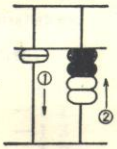
Illustration ⑦



Exercises

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

Illustration ⑧



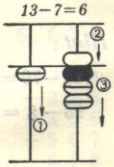
Hint :

10 − 8 = 2
2 + 2 = 4

Exercises

12 − 9 = 3	15 − 9 = 6
11 − 8 = 3	16 − 8 = 8
11 − 9 = 2	16 − 9 = 7
13 − 9 = 4	

Illustration ⑨



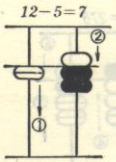
Hint :

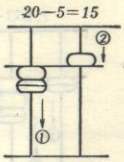
10 − 7 = 3
3 + 3 = 6

Exercises

13 − 4 = 9	12 − 7 = 5
13 − 6 = 7	14 − 7 = 7
13 − 8 = 5	13 − 8 = 5
12 − 6 = 6	14 − 8 = 6
14 − 6 = 8	14 − 9 = 5

Illustration ⑩

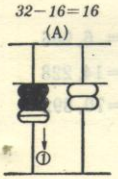


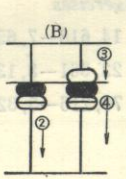


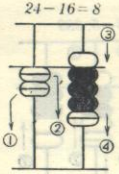
Exercises

11 − 5 = 6
13 − 5 = 8
14 − 5 = 9

Illustration ⑪







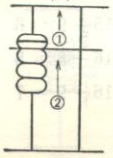
Exercises

43−24=19
44−26=18

Illustration ⑫

$50-25=25$

(A)



(B)

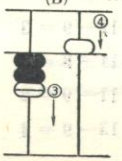


Illustration ⑬

$54-8=46$

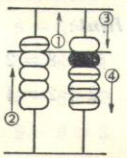
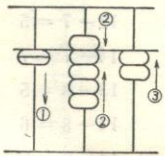


Illustration ⑭

$100-8=92$



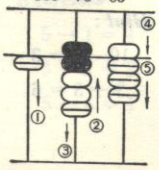
Hint :

$100-10=90$

$90+2=92$

Illustration ⑮

$163-78=85$



Hint :

$163-70=93$

$93-8=85$

Illustration ⑯

$1,058-650=408$

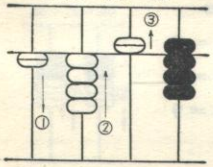


Illustration ⑰

$1,053-777=276$

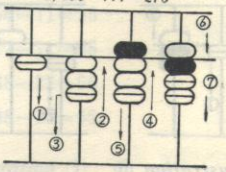
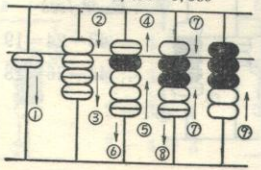


Illustration ⑱

$13,627-8,238=5,389$



Exercises

$14,618-7,652=6,966$

$22,361-8,133=14,228$

$76,216-5,324=70,892$

To brush up your skill in subtraction, do the following exercises as many times as necessary until you are free from mistakes. Do slowly first, then try to speed up at every turn.

66	99	555	1,234
−12	−21	−32	−156
−13	−19	−61	−234
−19	−16	−53	−128
−11	−30	−72	−357
11	13	337	359
5,678	9,980	8,631	10,000
−123	−231	−111	− 32
−234	−555	−222	−123
−345	−311	−333	− 61
−456	−422	−444	−256
−567	−610	−555	− 84
−678	−721	−666	−432
3,275	7,130	6,300	9,012

SECTION 4

MULTIPLICATION

Multiplication is the process of taking one number as many times as there are units in another, or, is a short process of finding the sum of several equal numbers. The ***multiplicand*** is the number taken or multiplied ; the ***multiplier*** is the number that shows how many times the multiplicand is taken ; and the ***product*** is the result of multiplying.

For instance ·

4 × 5 = 20

(Multiplicand) (Multiplier) (Product)

As in Written Arithmetic, the fundamental requisite for the abacus operator to do multiplication is to have a masterly knowledge of one-figure multiplication. You know already how to multiply such numbers as in 3×3, 6×8 or 4×9. You ought to have memorized the following table and remember how much the products of these numbers are.

In the table, the numbers in the extreme left column may be regarded as the ***multipliers*** and those across the top as the ***multiplicands***. The numbers in the horizontal rows opposite the multipliers and under the multiplicands will be the products.

They may be read thus : 3×2 equals 6, 9×3 equals 27, 9×9 equals 81, etc.

Multiplication Table

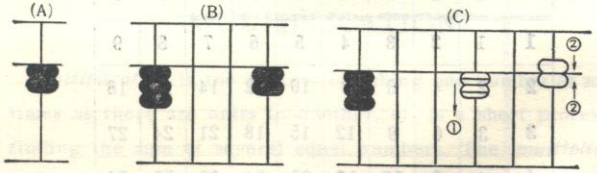
	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

Before you deal with the illustrations, you may as well remember the following facts.

In the process of multiplying on the abacus, the multiplier is placed on the left-hand side whilst the multiplicand on the right-hand side. But the Column adjacent to the right Side Frame (that is the Column at the extreme right) cannot be taken as the unit's place of the multiplicand. Instead, this Column is used as the unit's Column of the product. In the actual practice, however, the numbers may be put in any place so long as there is a place for the product.

Illustration ①

2 (Multiplicand) × 3 (Multiplier) = 6 (Product)



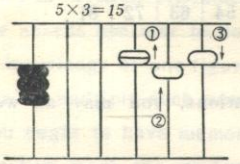
Multiplicand *2* is placed.

Put *3* (Multiplier) at the left of the *2* leaving two or three Columns vacant merely to avoid confusion.

Cancel *2*(Multiplicand). Put *6* on the second Column to the right of the unit's Column of the multiplicand.

Exercises $1 \times 3 = 3$ $2 \times 4 = 8$ $3 \times 3 = 9$

Illustration ②



Exercises

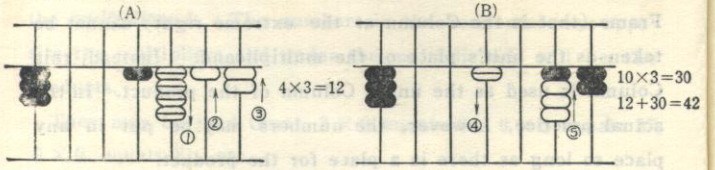
$3 \times 6 = 18$

$4 \times 5 = 20$

$6 \times 6 = 36$

$7 \times 8 = 56$

Illustration



Exercises

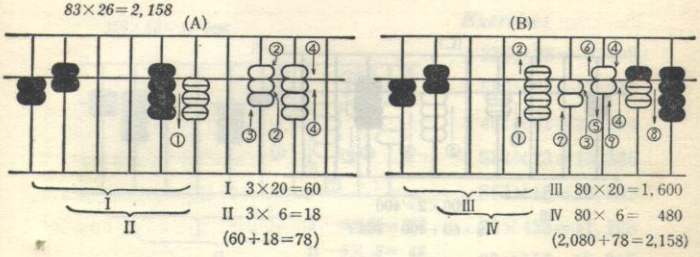
$12 \times 5 = 60$ $35 \times 8 = 280$ $61 \times 4 = 244$

$26 \times 4 = 104$ $47 \times 7 = 329$

Notes :

1. Through the above illustrations, it is now clear that, if the multiplier is of *one* digit, the units of the product will always take their place on the *second* Column to the right of the unit's Column of the multiplicand provided that they are all integral.
2. Similarly, when the multiplier is of *two* digits, the units of the product will take their place on the *third* Column (that is, leaving two Columns vacant) to the right of the unit's Column of the multiplicand. This you will see in the illustrations and exercises below.
3. In short, leave vacant the same number of Columns as that of the figures of the multiplier between the Columns of the units of the multiplicand and the product.

Illustration ④



Exercises

$36\times48=1,728$　　$33\times22=726$　　$55\times60=3,300$

$27\times13=351$　　$41\times32=1,312$

Illustration ⑤

Exercises

$123\times2=246$

$323\times2=646$

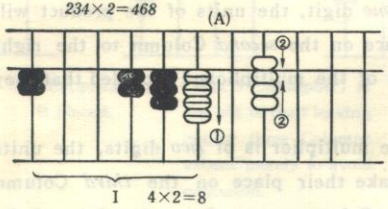
$423\times2=846$

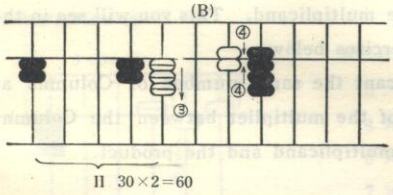
$222\times3=666$

$121\times4=484$

$322\times3=966$

234×2=468





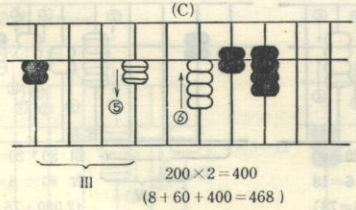
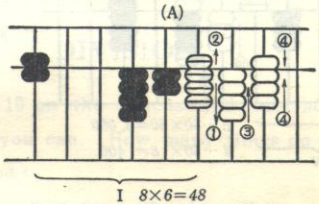
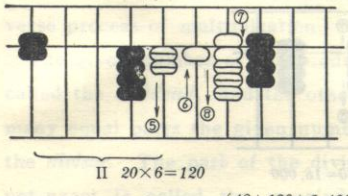
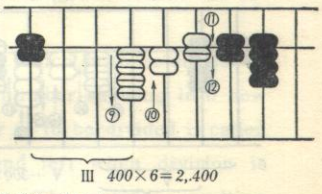


Illustration ⑥

428×6=2,568







(48+120+2,400=2,568…Ans.)

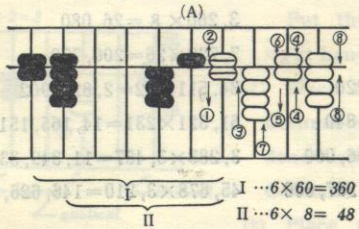
Exercises

$126\times3=378$　　$427\times8=3,416$　　$888\times9=7,992$

$258\times6=1,548$　　$562\times7=3,934$　　$325\times4=1,300$

Illustration ⑦

356×68=24,208



Exercises

$236\times28=6,608$

$555\times32=17,760$

$467\times62=28,954$

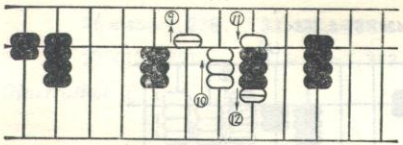
$582\times23=13,386$

$864\times18=15,552$

$26\times428=11,128$

$33\times555=18,315$

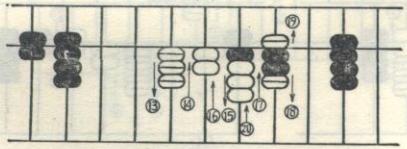
(B)



58×623=36, 134
66×962=63, 492
88×628=55, 264

III ···50×60=3, 000
IV ···50× 8= 400

(C)



V ···300×60=18, 000
VI ···300× 8= 2, 400
(I +II +III +IV +V +VI =24, 208···Ans.)

If you have mastered the above, then you are ready to deal with multiplication of multi-figured numbers as given below.

Exercises

4, 560× 6 =27, 360	3, 260× 8 =26, 080
5, 630×13=73, 190	7, 722×26=200, 772
23, 420×66=1, 545, 720	34, 511×82=2, 829, 902
21, 530×128=2, 755, 840	61, 321×231=14, 165, 151
6, 520×2, 300=14, 996, 000	3, 283×3, 457=11, 349, 331
25, 600×4, 271=109, 237, 600	45, 678×3, 210=146, 626, 380

SECTION 5

DIVISION

Put the number 10 on the abacus and subtract 2 from it as many times as you can. How many times do you subtract before it is finished?

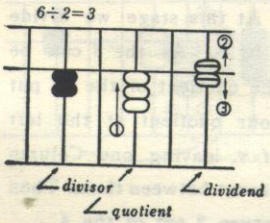
Yes, division is a short form of subtraction, and is the reverse process of multiplication.

The given number or the product which is to be divided is called the *dividend*, and the other number showing into how many equal parts the given number is to be divided is called the *divisor*. The part of the dividend left when division is not exact is called the remainder. The number resulting from division is the quotient.

For instance,

6 ÷ 2 = 3
(Dividend) (Divisor) (Quotient)

Illustration ①



(1) Put the dividend *6* on the right-hand side Column.

(2) Place the divisor *2* on the Column at the left of the dividend Column, leaving 3 or 4 Columns vacant.

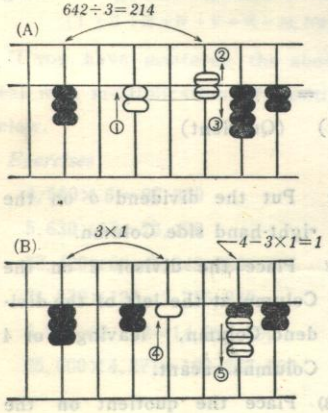
(3) Place the quotient on the

Column at the left of the dividend leaving *one* Column vacant between them *if the first left figure of the divisor* (though it is of only one figure in this case) *can be the integer quotient of the first left figure of the dividend* (though it is of only one figure in this case).

Then cancel the *6*.

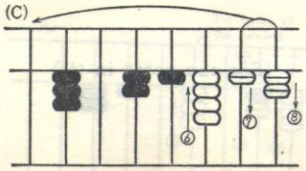
You will see later that the quotient may be placed *next door to the first figure of the dividend* when the first left figure of the divisor *cannot* be the integer quotient of the first left figure of the dividend (that is when the latter is smaller than the former).

Illustration ②



(A) As the *3* can be the quotient of the *6*, place your quotient at the left of the dividend, leaving one Column vacant between them as explained in the last illustration.

(B) At this stage we divide *4* by *3*. As the *3* can be the quotient of the *4*, put your quotient at the left of *4*, leaving one Column vacant between them. Then return 3 out of the *4*.



(C) You will find that the *1* cannot be divided by the *3* (divisor). So you may take the adjacent figure *2* to make *12*. Now you will divide the *12* by the *3*.

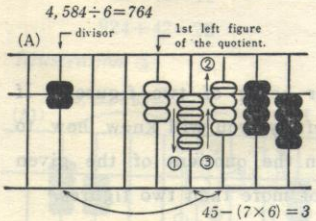
In this case, the *3* *cannot* be the quotient of the first left figure (= 1) of the dividend (=12), so put your quotient *4 at the left of* the *1* adjoiningly as explained in the previous illustration.

Finally cancel *12*, to leave only the quotient *214* beside the divisor *3*.

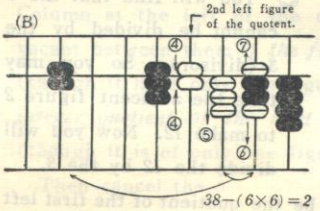
Exercises

26÷ 2 = 13	7,775÷ 5 = 1,555
54÷ 3 = 18	73,992÷ 6 =12,332
664÷ 4 =166	88,888÷ 4 =22,222

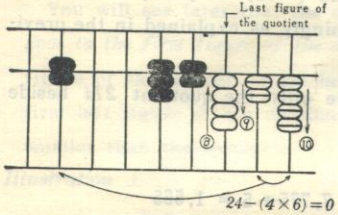
Illustration ③



Note that *6* *cannot* be the quotient of *4*. So, take the adjacent *5* to make *45*. Then divide it by *6*.



(See the notes in (A))



(See the notes in (A))

Exercises

255÷ 3 =85　　332÷ 4 =83

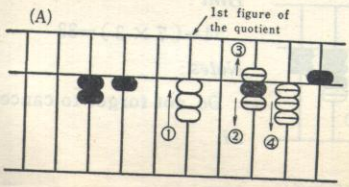
686÷ 7 =98　　465÷ 5 =93

864÷ 9 =96　　570÷ 6 =95

Illustration ④

735÷21=35

This is the case of a divisor being of two figures. If you trace the illustration carefully, you will know how to manipulate the beads to obtain the quotient of the given dividend when the divisor is of more than two figures.



Hint :

73−(3 ×21)=10

Notes :

To obtain the first figure of the quotient, divide the first figure of the dividend by the first figure of the divisor.

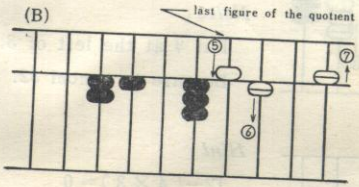
Hint :

105÷21= 5

Notes :

Note *5* is placed at the left of *1* adjoiningly.

Do not forget to cancel *105* before you finish.



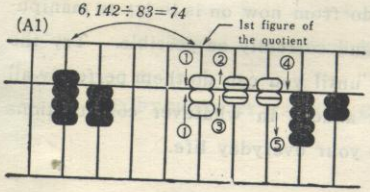
Exercises

492÷12=41

528÷48=11

924÷42=22

Illustration ⑤



Hint :

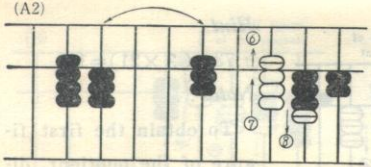
61−(7 × 8)= 5

Notes :

Put *7* at the left of *6*.

Do not forget to cancel *56*.

(A2)



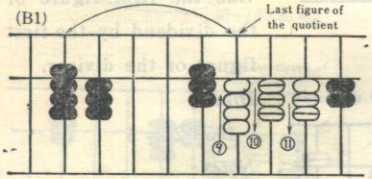
Hint :

54−(7×3)=33

Notes :

Do not forget to cancel *21*.

(B1)



Hint :

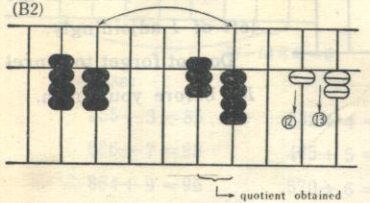
33−(4×8)= 1

Notes :

Put *4* at the left of *3*.

Be sure to cancel *32*.

(B2)



Hint :

12−(4×3)= 0

Notes :

Be sure to cancel *12* before you finish.

Now you are through with the methods of ADDITION, SUBTRACTION, MULTIPLICATION and DIVISION by the abacus. All you have to do from now on is to try to manipulate the beads as rapidly and correctly as possible. Try the exercises again and again until you can do them perfectly all right, and try to use your abacus in whatever computations you may have to make in your everyday life.

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