Abacus: A brief history from Babylon to Japan

Introduction

Remember ENIAC, the world's first computer? Obviously.
Would you still buy it for your daily work? Obviously not.

In this modern era of technology, what was launched yesterday can become outdated today. So, how can we be expected to use a 66 year old computer?

But what if we tell you that you as well as the entire world still use the first calculator created. Abacus, an instrument to calculate or count by using sliding counters and rod is indeed the world's first calculator. Abacus was in use in Europe, China, Russia.

The old version of the Abacus was a shallow tray consist of sand, and numbers could be erased easily when needed, but the modern abacus is made of wood or plastic. It is a rectangular box consist of nine vertical rods strung with beads.

A horizontal crossbar that is perpendicular to the vertical rods divides them into unequal parts. The beads above the horizontal crossbar are called Heaven beads, and the beads down the bar called earth beads.

Though the Abacus originated in Babylon, it had traveled a long way from the Middle East to Japan and China. When it traveled from one country to another it transited also. In China, it is called as **Suanpan**. In Suanpan it has 25 decks.

The famous Japanese mathematician Seki Kawa replaced 25decks with 14decks and called it **Soroban**. The modern-day abacus which we use today is the Soraban type of abacus.

A brief history of Abacus

The word Abacus derived from the Greek word ‘abax’ which means ‘tabular form’. It was said to be invented from **ancient Babylon in between 300 to 500 bc**. Abacus was the first counting machine.

Earlier it was fingers, stones, or any various kinds of natural material.
It was widely in use in different countries from the Middle East to Japan, China, Russia as well as Europe.

When the Hindu number system introduced zero and also the Arbi number system came into use, the use of the abacus diminished and it became limited to counting the Place value of numbers only.

Abacus throughout the ages

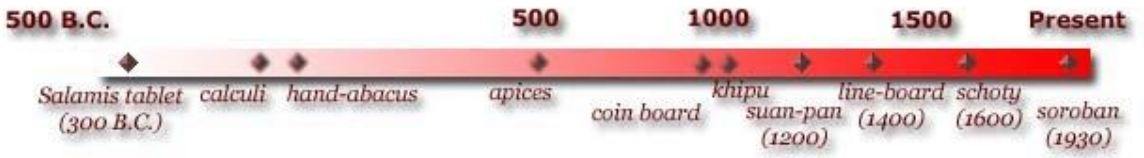
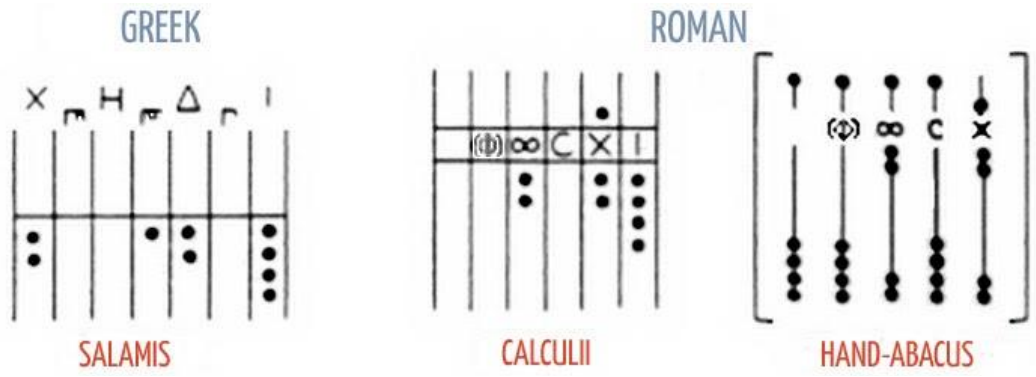


Fig. The line is showing the evolution of the Abacus from a counting board to the present-day the abacus.

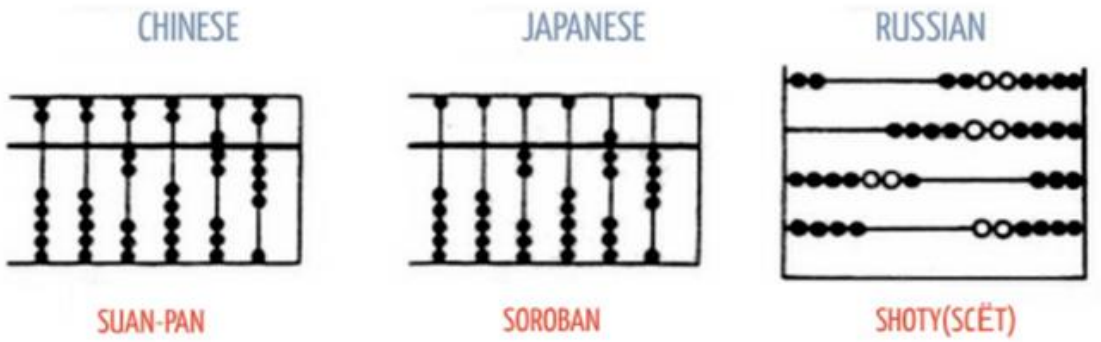
The timeline can be divided into three categories:

- **Ancient times: 300BCE to 500 BCE**
  Example: Salamis tablet, Roman calculi



- **Middle age:5CE to 1400CE**
  Example: The Apices, The Coin board.

- **Modern times: 1200AD to Present.**
  Example: Suan pan or Chinese abacus, Soroban or Japanese abacus, Shoty or Russian abacus.



Mesopotamian

Mesopotamia or Sumerian civilization was one of the oldest civilizations in human history. Between 2700bc to 2300 bc, Sumerian used the first abacus to count. It is the belief that Old Babylonian scholars have used this abacus to do addition and subtraction. Old Babylonian scholars such as Curricio believe that the old Babylonian used their sexagesimal number system in Abacus to calculate.

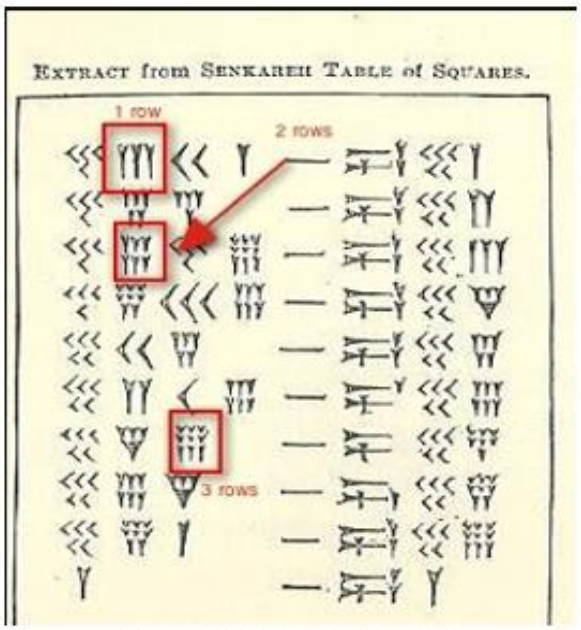


Fig. Mesopotamian Abacus.

Greek

There is archeological evidence of usage of the abacus in Greek during 5th-century bc. The Greek abacus was a wooden or marble frame consist of small counters of metals.

The oldest counting board discovered on a greek island which is assumed to be 300 bc old. It is a marble slab of 149cmx75cmx4.5cm and 5 groups were marked. In the middle of the slab, 5parallel lines are marked and divided by a vertical line.

Below this line, there is a wide space and a horizontal crack. Below the crack there are again eleven parallel sets of lines and divided perpendicularly by a vertical line. As it was discovered on the Greek island Salamis so it is named Salamis Tablet.

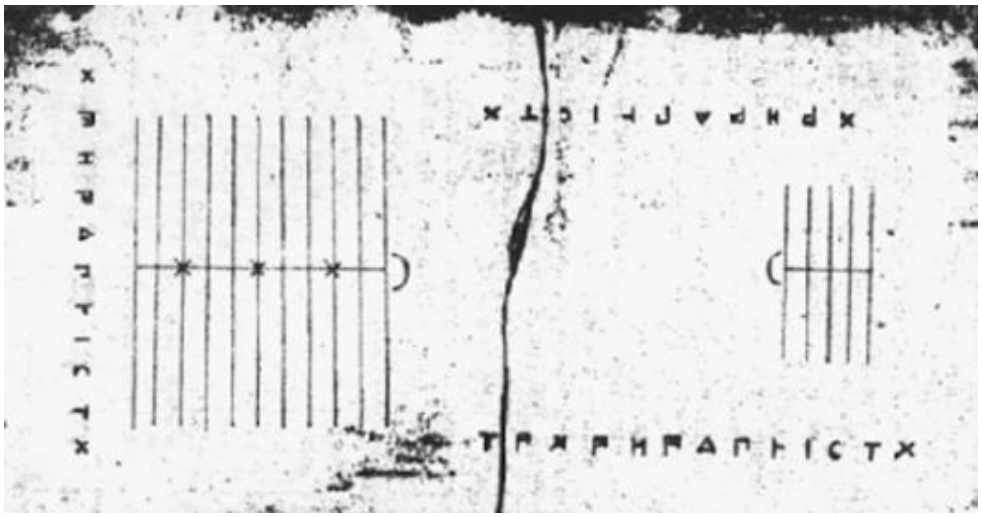


Fig.Photograph of Salamis tablet. Now kept in The National Museum of Epigraphy in Greece.

Chinese

The name of the Chinese Abacus is Suanpan, which means calculating tray. It is 20 cm long and has more than seven rods. The hard wooden beads are arranged in two parts, there are two beads in each rod in the upper part and five beads in each rod in the bottom parts. Below each rod, some numbers are written showing the place vale.

The Chinese abacus appeared during the Han dynasty at that time beads were oval. During the later Ming dynasty, the suanpan followed the ratio 2:5 that means the upper deck had two beads and the lower deck had five beads.

Fig. Suanpan Abacus

Roman

The Roman abacus was a smooth table and some counters, originally pebbles. Later Pope Sylvester reintroduced Abacus with some modifications and after that, it became widely used in Europe. Instead of the counting board in this Abacus wire and beads have been used.

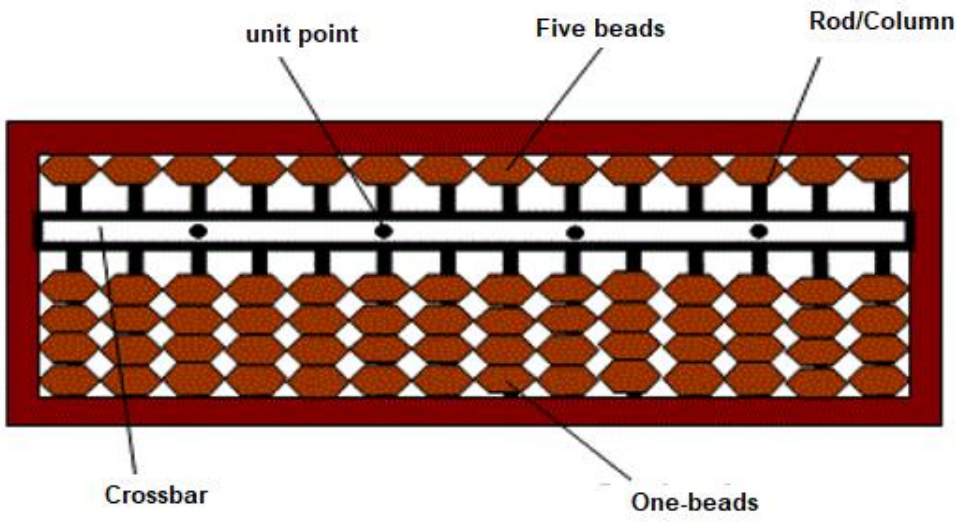
During the 1st century AD, the Roman abacus again reconstructed having eight long grooves consist of up to five beads and eight shorter grooves having no or one bead each. The groups are marked as I for units, X for tens, and so on. The smaller groove's beads were denoted as five units, five tens, etc. The short grooves on the sides are used to denote Ounces that means fraction.

Japanese

The Japanese abacus is known as Soroban. It was imported from China during the 14th century. But Japanese Abacus is a 1:4 abacus, the upper deck has one bead and the bottom deck has four beads. The bead on the upper deck has the value five and each bead of the bottom deck has value one. The beads were diamond-shaped.

Japan had two other kinds of the abacus, 3:5 abacus known as 天三算盤 and 2:5 type abacus.

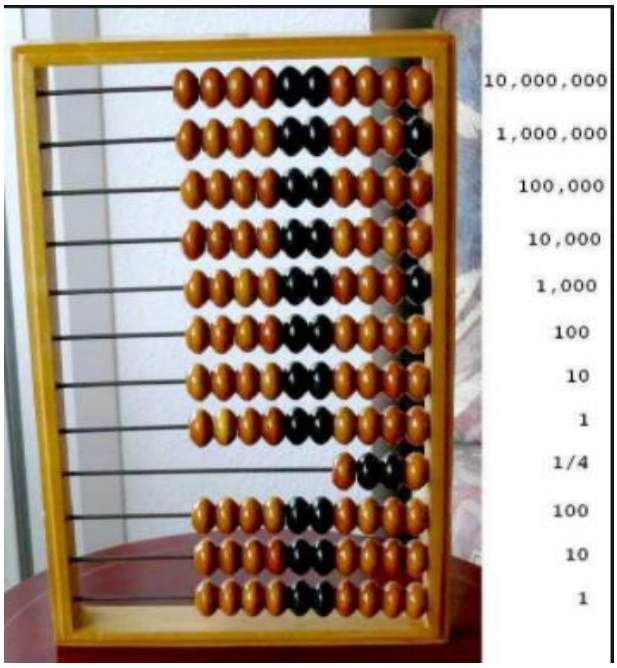
The abacus is still widely used in Japan which is modified and modernized.



Russian

The Russian abacus is known as the" schoty" which has one single deck and ten beads in each wire except one which has four beads. This abacus is often used vertically moved from left to right. The 5th and 6th beads are of different colors for easy viewing and the left bead of thousand is also of different colors.

The abacus was widely used in Soviet Russia until the 1990s.



Indian

Abacus was widely used in ancient India. We can find clear evidence of the uses of the abacus from Abhidharmakoshavasya, a book by Vasubandhu, a Buddhist scholar, and philosopher. The usage of Sunya or zero is also mentioned here.

Abacus Today

The abacus is still widely used in Asian schools and some Western schools also. In Japan and China, Abacus competition is a big thing.

The abacus tool is now mainly used to teach Place values in number systems and multiplication to the children.

The abacus is now available in the form of a portable computing device. In the 21st century, the abacus is now used as a teaching tool only.

Abacus basics

We can use an abacus to solve all kinds of arithmetic operations such as addition, subtraction, multiplication, and division. It consists of rods and each rod contains some beads.

There are many kinds of abacus present but the Japanese abacus or soroban is the widely used one. It has 4 beads at the bottom deck and 1 bead at the upper deck. Each rod can represent any number between 0 to 9 that is 10 numbers. The beads above the

horizontal crossbar are known as Heaven beads and the bottom one is known as earth beads. We have to count or calculate by moving the beads up and down.

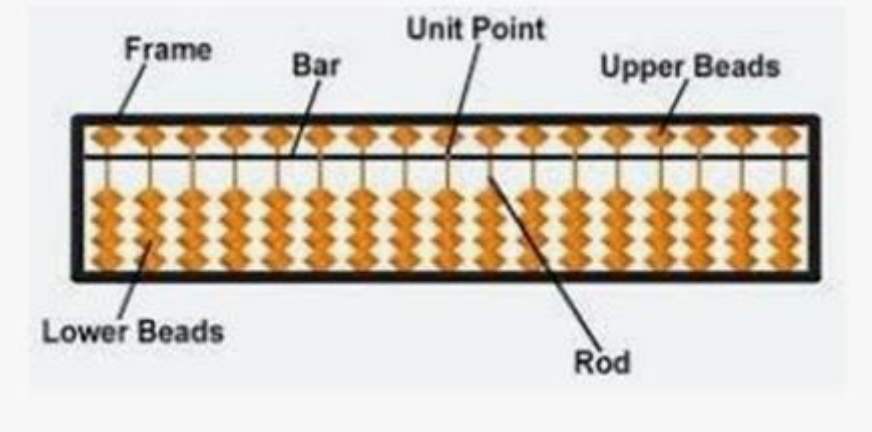
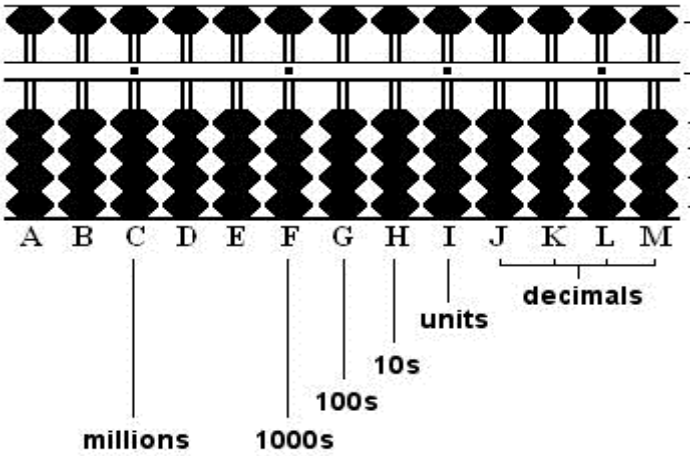
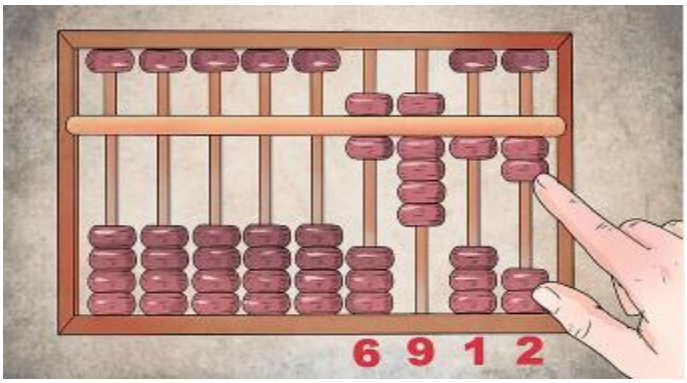


Fig. Structure of Japanese abacus.

- In Soroban, the beads are arranged according to place value from right to left.



- When no beads are touching the horizontal bar that means no number is showing. To show or count any number we have to move the beads. Beads which are touching the bar represents a number according to their position.

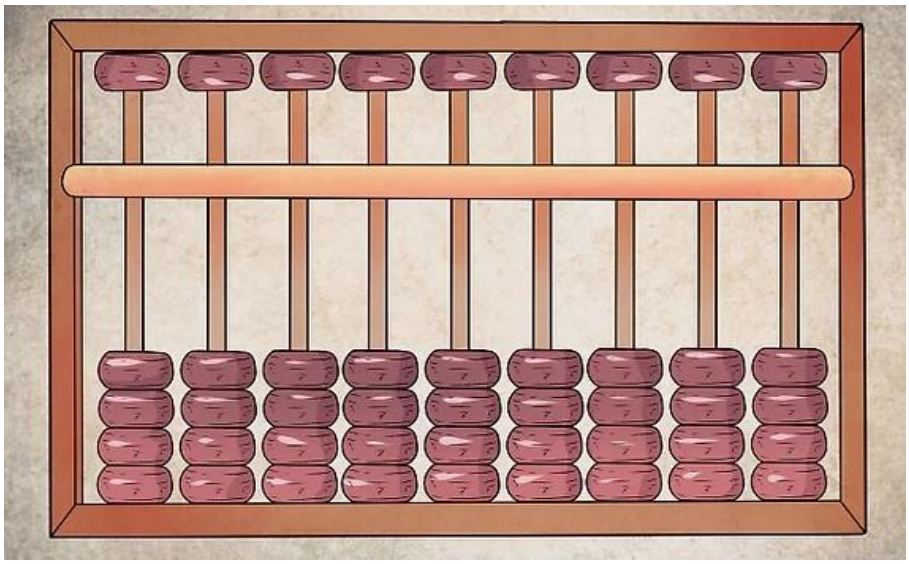


The number showing in the above abacus is 6912 or six thousand nine hundred twelve. For more about Abacus Basics, check out Abacus from Basics.

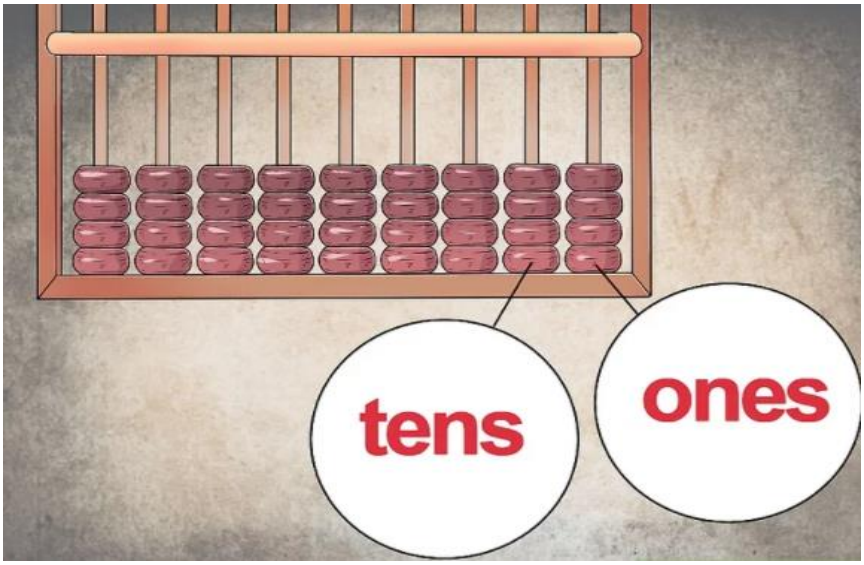
Abacus techniques

Counting

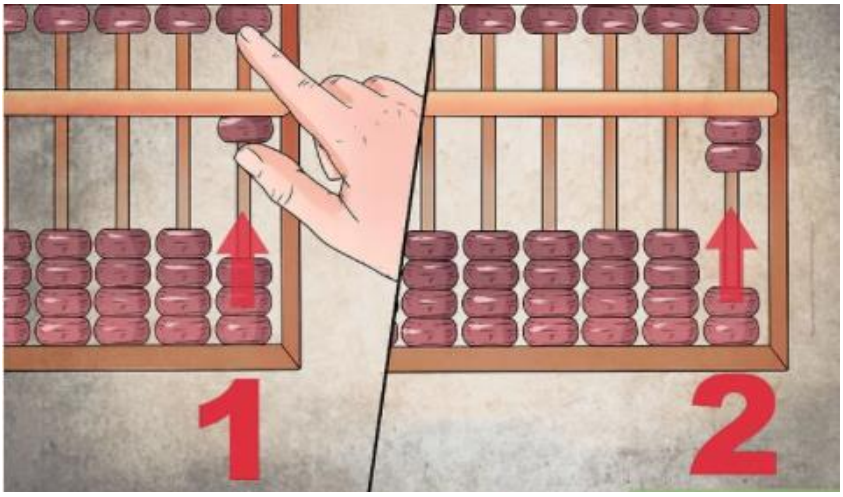
Arrange the Abacus: The beads of the abacus will be in its original position that means no beads will touch the reckoning bar. And showing the number zero.



B. Assign each vertical rod the place name: The rightmost rod named as Ones followed by tens, hundreds, and so on. We can assign a decimal place also. If we want to represent a decimal number such as 10.5 then the rightmost column will be the tenth place, earlier it was one's place and followed by the place of the whole numbers such as ones and tens.



C. Start counting: We always have to start counting from the bottom deck. Number one should be represented by moving one bead of one's place towards the horizontal reckoning bar. Similar way, by moving the beads towards the reckoning the bar we can make any number.

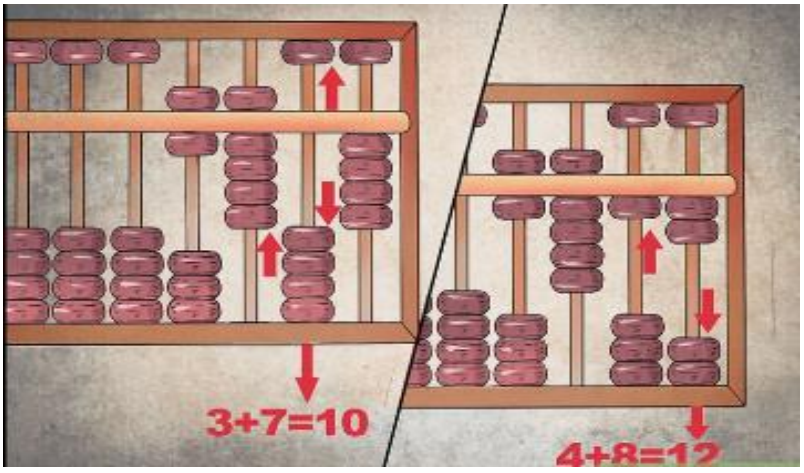


As the bottom row has only four beads to make a number more than 4, we have to move back the bottom deck's bead to its original position and bring down the heaven bead towards the reckoning bar. To make 6 with the heaven beads need one earth bead touching to the reckoning bar.

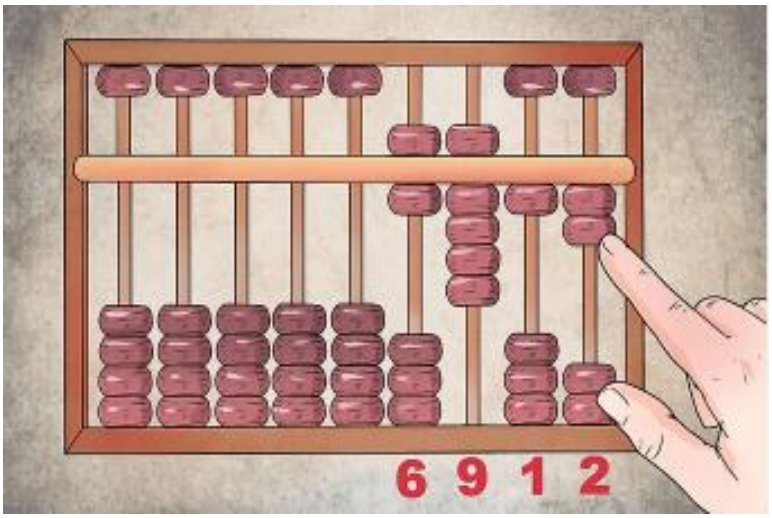
Adding and subtracting

A. To add a number, let's take 1234 with another number, we need to make the number 1234 first by moving the beads according to their place. Now we have to start adding from the left that is the highest place, in this case, it is the thousand place, and have to add 1 and 5. And gradually to the lower places.

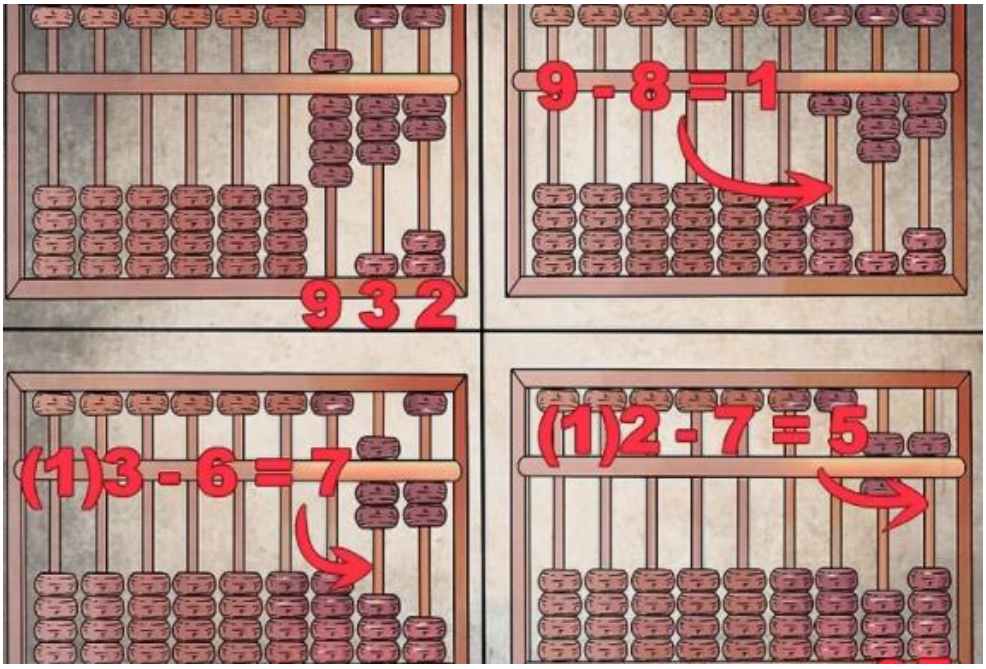
Since the tens place has carried over(3+7=10) so have to add one bead at a hundred's place and moving the tens' bead to its original place making the value zero. The same way has to add one's place also.



Now have to read from the left side, 1234+5678= 6912



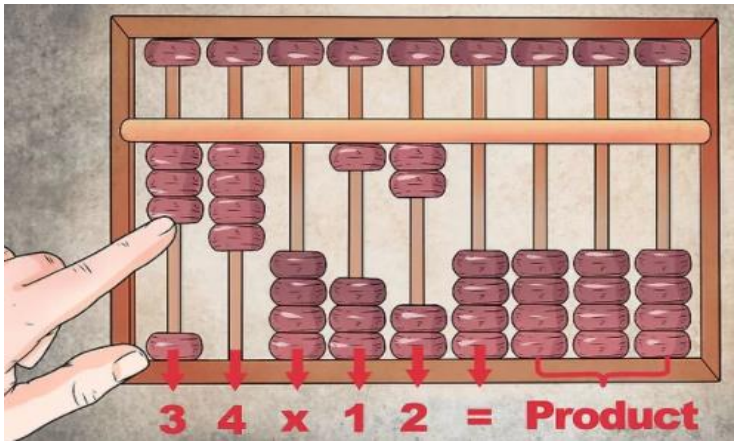
B. Subtraction is the reverse process of Addition. We have to make the greater number first by moving the beads in the same way. And have to borrow instead of carrying over.



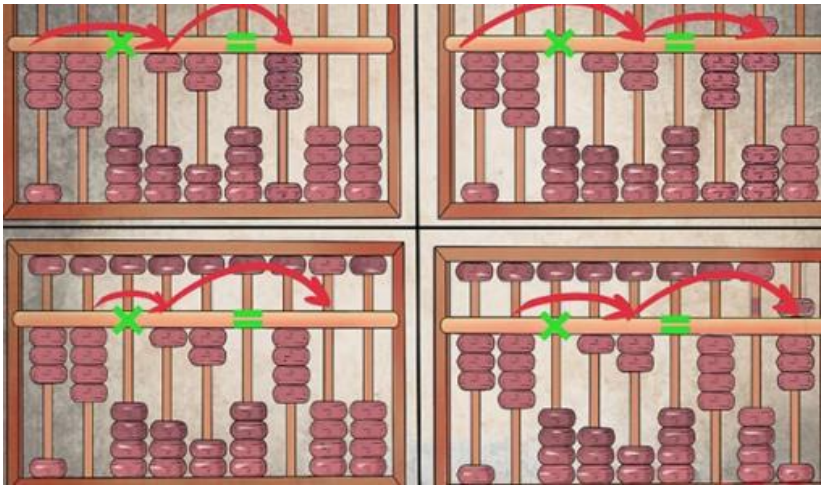
The subtraction will be 932-867=65

Multiplication and division

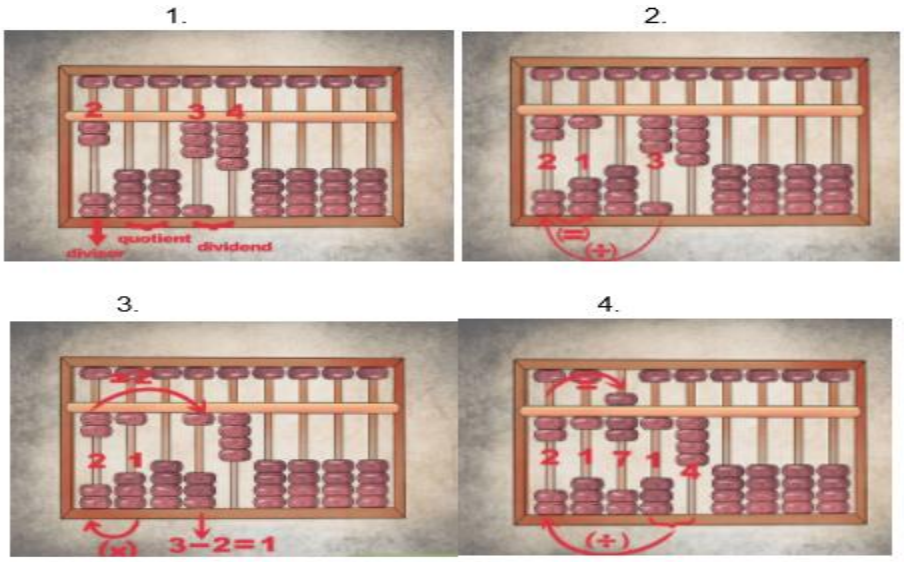
To do multiplication we have to assign the numbers from the left. Let's take 34x12, so we have to assign the from left to right, "3" "4" "x" "1" "2" "=" "product" and for the x and = sign have to leave the rods in zero position.



To multiply the numbers, we have to multiply the first column with the first column of the other number and again the 1st column to the second column of the other number.



To divide, let's take 34 by 2, we have to take 2 in the left-most column and have to keep two columns blank or as zero and then 34.

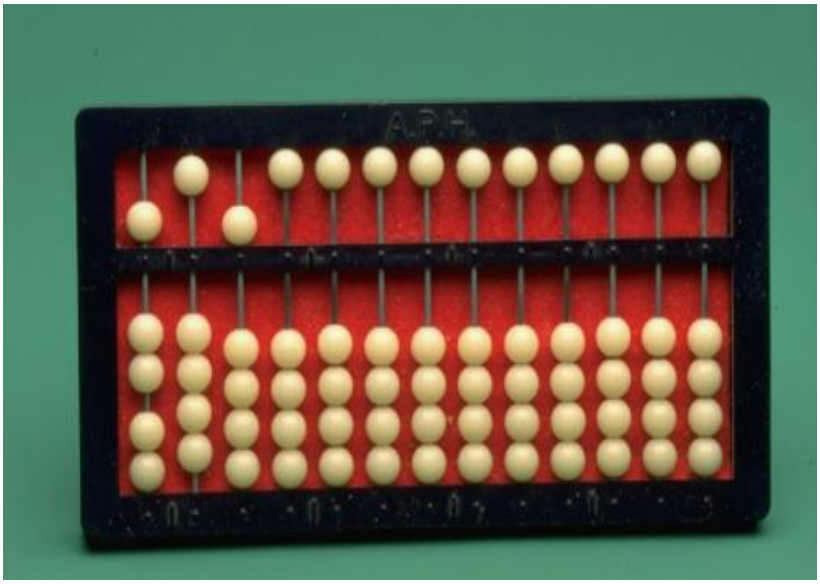


Conclusion

The Abacus is the oldest counting equipment. From 5000 years ago to this 21st century, the abacus went through many transitions. It started with a tray of sand and became a computerized calculating device.

It is a huge journey but the sole purpose of the abacus remains the same, making the calculation easier.

Though Abacus is now replaced by electronic calculators and computers, as a mathematical teaching tool, its role is still undeniable. Not only for technological advancement but it is also still very useful and important for blind people and is referred to as Cranmer Abacus.



If you want to see the magic of Abacus learning for yourselves, check out this Tedx Talk by Raghav Raahul where he dispels the genius myth, unveiling the method behind his magic of mental math, and explains anyone can do the same.

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