

Soroban

The Japanese Abacus
By Kimie Markarian

算盤

Japan 21 has class sets of soroban and teaching soroban available for loan; please contact us on 020 7630 8696 or education@japan21.org.uk

Japan 21, Swire House, 59 Buckingham Gate, London SW1E 6AJ
Tel: 020 7630 8696 Fax: 020 7931 8453
Email: education@japan21.org.uk Website: www.japan21.org.uk



National Curriculum Links

KS2 Mathematics

Ma2: Number

1c) Pupils will select and use appropriate mathematical equipment (in this case the soroban) to help them find the solution to problem.

2i) Pupils will understand and use decimal notation with regard to money and use the soroban to help with calculations.

3k) Pupils will use a soroban for calculations involving several digits, including decimals and know how to select the correct sequence for calculations.

Soroban is the name of the Japanese abacus, used for 450 years, since its arrival in Japan from China in the middle of the 16th century. Over time, the structure of the abacus has been refined to its present form (see illustration), which has been in general use since 1938.

In Japan, the art of using the soroban has been carefully cultivated: in 1928, soroban examinations were established by the Japanese Chamber of Commerce and Industry, with more than a million candidates sitting the tests by 1959. Although complex calculations are now carried out by computers, the soroban is still in use in some offices and shops, alongside computers and electronic calculators.

When used by an expert, the soroban is capable of difficult calculations, but at a more basic level it can also be a useful tool in general mathematics education. It enables figures to be represented in a concrete visual way, which can help pupils' grasp of numbers, particularly in understanding place value and in overcoming problems arising from the irregular construction of number words in the '-teens' and '-tys'.

Soroban can be used effectively in whole class teaching: where schools do not have access to a large teaching soroban, a soroban frame drawn on an OHP transparency can substitute. Japan 21 has a class set of soroban and a teaching soroban available for loan, please contact us on 020 7630 8696 or education@japan21.org.uk if you wish to borrow them.

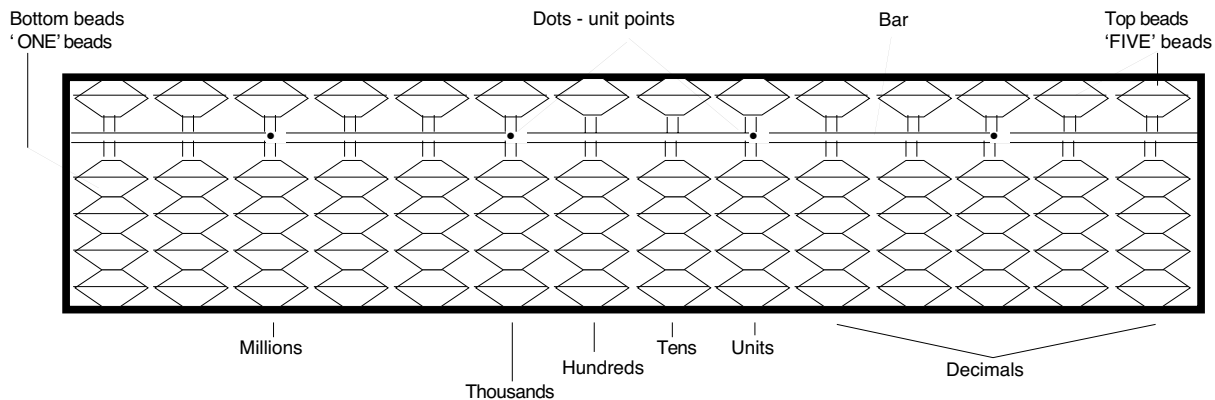
There are certain conventions connected with soroban use which may be introduced to create a distinctive working atmosphere. In traditional soroban classes, the teacher will often read out a string of numbers which the students calculate on their soroban. When the correct answer is given all those who have the same answer say "go-meisan" ("that's right"). This kind of oral exercise requires concentration and can improve listening ability. Achieving the correct answer may also increase motivation.

Pupils are asked to hold the soroban steady with their left hand, hold a pencil ready with the second, third and fourth fingers of the right hand and use the right thumb and forefinger to move the soroban beads. Left-handed pupils may work in reverse.

Before beginning, the soroban is "cleared" by:

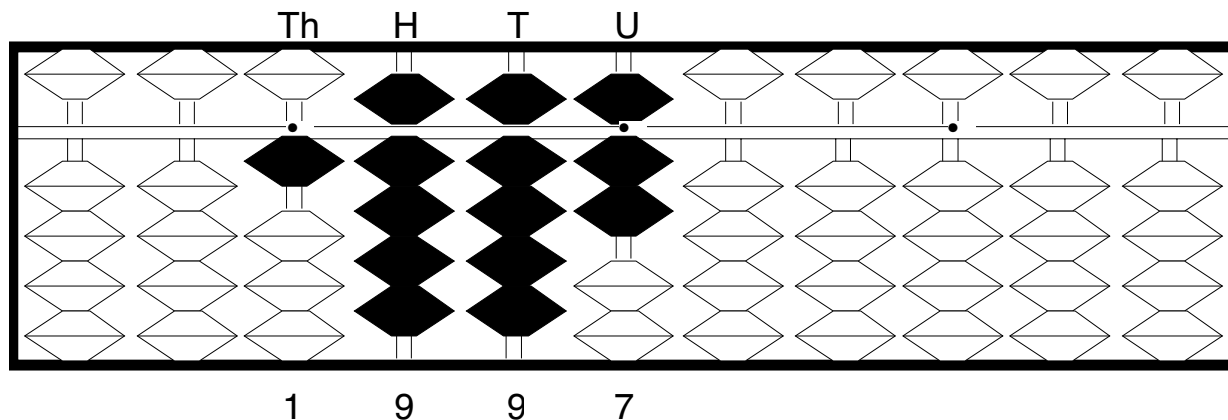
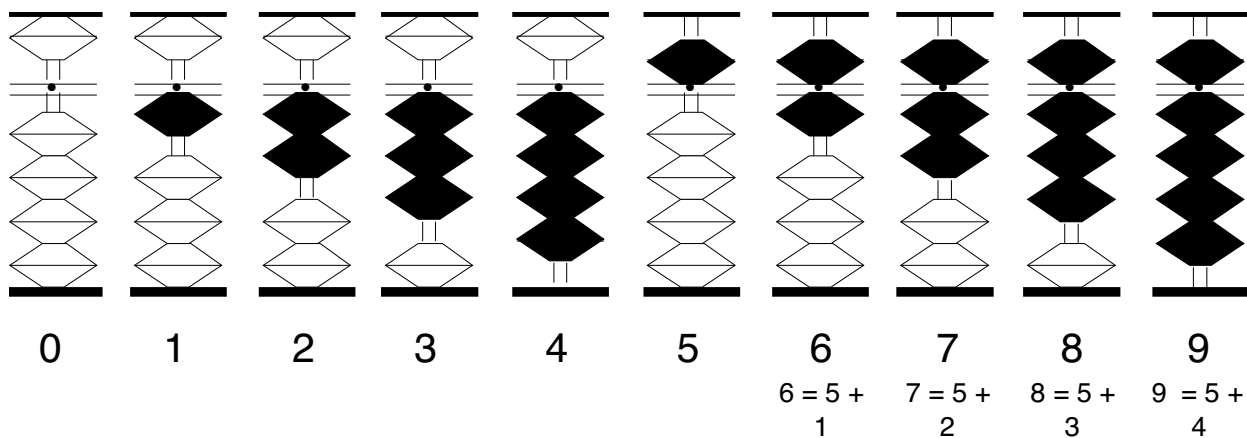
1. tilting it up towards you with the left hand, so all the beads drop down.
2. gently laying it flat on the table.
3. running the right forefinger along the bar to push the 'five' beads to the top.

With no beads touching the bar the soroban now reads 'zero'. Beads are only counted when they touch the bar.



This soroban reads 'zero'

The illustrations show how to display the numbers 1-9. Note how numbers 6-9 are all shown with a combination of one "five" bead and "one" beads. The same principle applies to the tens, hundreds, thousands columns.



When practicing setting numbers on the soroban it can be fun to use numbers with some significance, for example the year, as shown here, or perhaps the number of pupils in the class, days in the year or even numbers on a Japanese theme, such as the height of Mount Fuji, the population of Japan.

Beads are moved in the following way:

bottom beads: (ones)

- upwards (towards the bar) - with thumb
- downward (away from the bar) - with forefinger

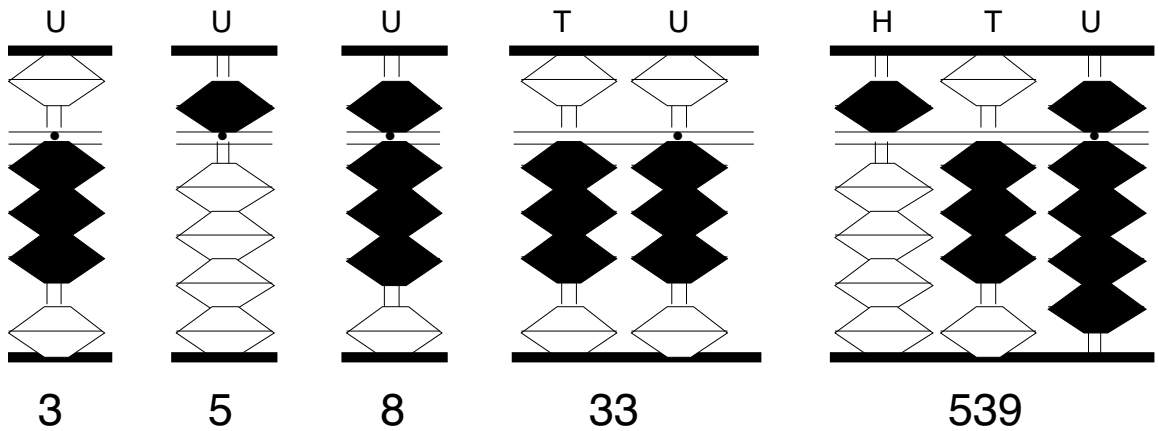
top beads: (fives)

- upwards (away from the bar) } both with forefinger
- downward (towards the bar) }

When both top and bottom beads are required simultaneously, they are 'pinched' between thumb and forefinger. eg to set numbers 6 - 9.

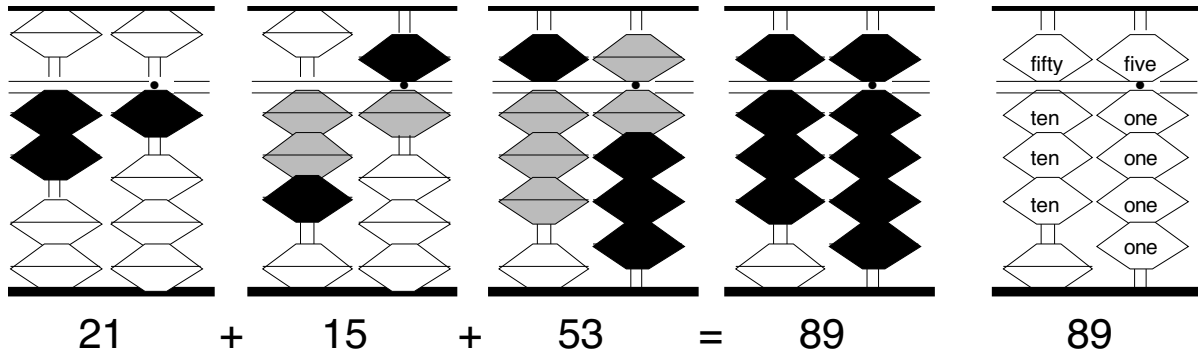
Simple Activities

- Using a large teaching soroban or a soroban frame on an OHP, ask pupils to read off numbers, for example:

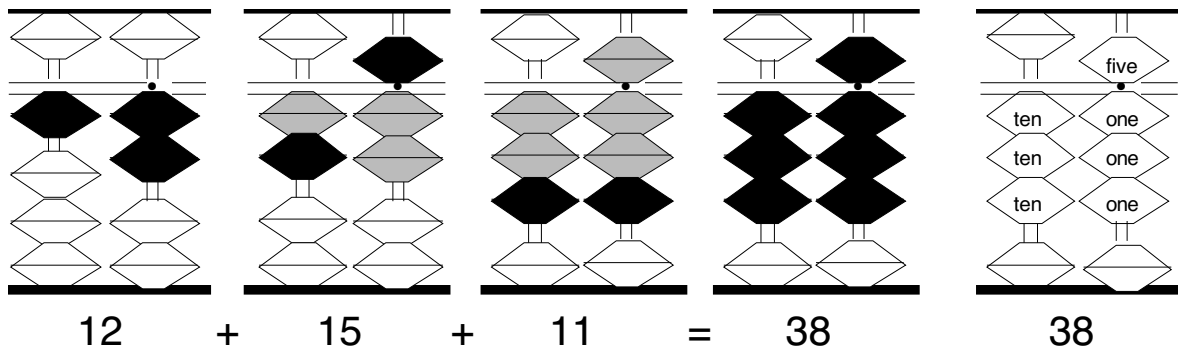


- Ask pupils to set numbers themselves (as above).
- Ask pupils to add / subtract numbers and read off the answer
eg. $21 + 15 + 53 = 89$

(At this stage, be careful to choose numbers which, when added, do not require pupils to work in number bonds 5 or 10. This is not difficult, but could cause confusion in the early stages.)



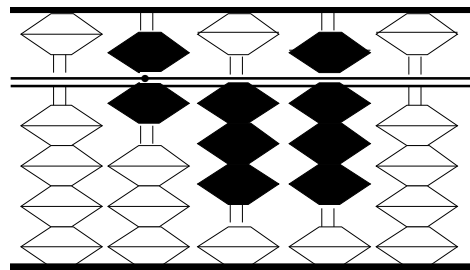
Simple sums can be used to reinforce irregular numbers eg twelve + fifteen + eleven = 38



4. Soroban can also be used to teach how to calculate in simple shopping situations.
 payment - cost = change

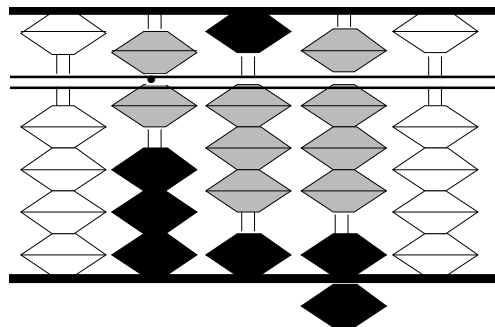
You buy two things at a cost of £5.13 and £1.25 and you pay with a £10.00 note.
 How much change should you get?

a) You add £5.13 to £1.25 with a soroban, which equals £6.38 (nb here units = £, decimals = p)



$$£5.13 + £1.25 = £6.38$$

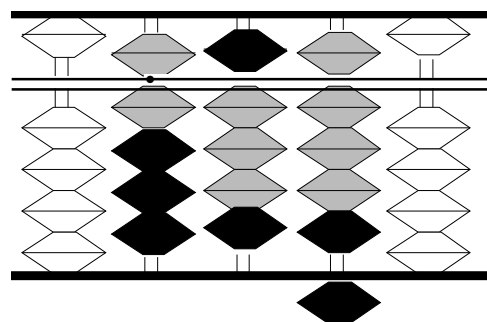
b) You calculate the change by adding '0.01' to the unmoved beads '3.61', which will equal 3.62. 3.62 is the difference between the cost of you purchases and the amount tendered (£10.00).



$$£10.00 - £6.38 = £3.62$$

c) Add the change (£3.62) to the price (£6.38) and you will get £10.00

d) If you visualise soroban beads in your head it can help you check change when out shopping.



$$£3.62 + £6.38 = £10.00$$