Soroban: The Japanese Abacus

Unlocking the creative power of students to perform mental calculations is a key challenge for teachers. Soroban, the Japanese abacus, provides a visual and tangible tool, allowing students to see and manipulate a physical representation of abstract numbers. Ideally suited for pupils bridging Key Stage 1 and Key Stage 2 (advised for Year 2; activities can be differentiated to suit other years) this scheme of work is a perfect complement to your curriculum, helping students to: master place values, practice number bonds, and manipulate numbers quickly. Through active learning, the soroban can not only help consolidate arithmetic skills and improve concentration, but also provides a stimulating cultural framework to explore mathematical concepts through the lens of Japan.

CURRICULUM LINKS

Ma2/2.1 Number and Place Value

Ma2/2.1b: Recognise the place value of each digit in a 2-digit number (10s, 1s)

Ma2/2.1d: Compare and order numbers up to 100, use < and > signs

Ma2/2.1f: Use place value and number facts to solve problems

Ma2/2.2 Addition & Subtraction

Ma2/2.2c add and subtract numbers using concrete objects, pictorial representations, and mentally, including:

i. a two-digit number and 1s
ii. a two-digit number and 10s
iii. 2 two-digit numbers
iv. adding 3 one-digit numbers

RESOURCES

Soroban, either:-

- **Borrow:** Japan Society (class sets available for loan; subject to availability. Contact education@japansociety.org.uk)
- **Buy:** Tomoe Soroban Co. Ltd. http://www.soroban.com/english/shopping/ ('Plastic Soroban' ~£15 each incl. international delivery).
- **Make:** 5-Minute Soroban: https://www.instructables.com/id/5-Minute-Soroban/
- **Print:** A4 printout of soroban frame and beads (intended to enable students to practice at home). See additional resources)

- **Digital:** Soroban http://hp.vector.co.jp/authors/VA041064/english/index.html (Free download)

Worksheets: Practice worksheets 1, 2a, 2b, 3a, 4a, 4b, 5 (see downloads on lesson pages)

Videos: *Currently in development.*

Additional worksheets: Practice worksheets 3b, 4c, Ordering 1, Ordering 2, Ordering 3, Sequence (see additional resources for downloads)

Loan resources: Class set of soroban (as above), Large teaching soroban (optional, subject to availability)

Keywords

Soroban - Japanese abacus; Beads: 1 beads, 5 beads; position marker; clear - Setting the abacus to 0.

Assessment Tools

Worksheets: 1, 2a, 2b, 3a, 4a, 4b, 5 available for download.

Lesson	Learning Objective	Suggested Activities
1	**To identify and represent numbers 1-9 on a soroban**	Task 1 • Show students the soroban and ask to share ideas of what it could be, how it may be used and for what. Explain it is a Japanese abacus • Show **PowerPoint** introducing the soroban and its parts • Practice 'messing up' and 'clearing the soroban' to zero Task 2 • Explain how 1-9 are represented on the abacus using the **PowerPoint** • Students practice making 1-9 Task 3 • Briefly explain place value on soroban and check understanding of the position marker

		Task 4 • Pair activity: students use **Worksheet 1** 'Soroban Practice 1: Numbers 1-9' Extension Activities • Pair or group activity: students quiz each other on numbers 1 – 9 • Count together as a class from 1-9 moving the beads at the same time • Lay groundwork for next lesson – numbers above 9
2	To identify and represent two-digit numbers on a soroban.	Task 1 • Warm up: recap the previous lesson - clearing to 0 and numbers 1-9 • Explain how larger numbers are represented on the soroban Task 2 • Check understanding by making 2 digit numbers together Task 3 • Pair Activity: students practice making and reading 2 digit numbers Task 4 • Students complete **Worksheet 2a** - 'Numbers above 10' • Call out numbers up to 99 for students to make on their soroban Extension Activity • Group Activity: In small groups, students take turns to choose a two digit number for the other students to make
3	To use the soroban for addition	Task 1 • Warm up: recap 2 digit numbers - **Worksheet 3a** Greater or less than (0-100)' • You may choose to act the symbols out physically when checking answers Task 2

		• Recap how to clear the soroban and represent numbers • Show students how to use the beads correctly [*video in development*] • Introduce simple addition on the soroban*. Focus on correctly maneuvering the beads. Task 3 • Introduce addition sums with 2 digit numbers*. Show an example then call out sums for students to complete on their own soroban. Task 4 • Students to complete **Worksheet 4a and 4b** 'Adding numbers 1-9' and Adding numbers above 10 (Ones and Tens). Students can work in pairs. ***Refer to 'example sheet' for sums which do not involve carrying or breaking down the 5 bead.**
4	To use the soroban for subtraction	Task 1 • Warm up: recap the previous lessons of adding on the soroban and remind students how to correctly move the beads. Task 2 • Show students the sum 6+3=9. • Write 9- □=□ on the board. On mini whiteboards, students write as many different possibilities it could be. Take suggestions then focus on the 3 and 6. • Show the addition sum on the soroban and then the subtraction. Ask all students to start with 9 and call out different single digit numbers for them to subtract. Task 3 • Introduce subtraction sums of TO that do not borrow or carry E.g. 77-2=75. Show an example on the interactive soroban, and then call out sums for students to complete on their own soroban*.

		Task 4 • Students to complete **Worksheet 5** – 'Subtracting numbers' Students can work in pairs. ***Refer to 'example sheet' for sums which do not involve carrying or breaking down the 5 bead.**
5	Review and practice multiple operations on the soroban with fluency (addition and subtraction)	Task 1 • Warm up: Give a multi-stage question using addition and subtraction. • Give another question, this time using 2 digit numbers. Task 2 • Use the **PowerPoint** 'Let's Practice' for more multi-stage addition sums Task 3 • Play number bonds to ten 'tennis', an introduction to the 'make up to 10' idea required for carrying and borrowing on the soroban. • Say any number and 'serve' the imaginary ball, the students should reply with the number needed to make 10 and 'return' the imaginary ball. e.g. Teacher: 3, Students: 7, Teacher: 5, students: 5. See lesson plan for alternative number bonds activities. Task 4 • Group Activity: The students play number bonds matching with cards in small groups.