

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 has large-size teaching soroban (long-term loan) and class sets (short-term loan) available to borrow, 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: Visualising Numbers: Soroban as a tool for the maths classroom <https://youtu.be/-br2yp3tQ1M>

Tutorials for the teaching soroban: <https://www.japansociety.org.uk/soroban-videos>

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	<p>Task 1</p> <ul style="list-style-type: none"> • 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 <p>Task 2</p> <ul style="list-style-type: none"> • Explain how 1-9 are represented on the abacus using the PowerPoint

		<ul style="list-style-type: none"> • Students practice making 1-9 <p>Task 3</p> <ul style="list-style-type: none"> • Briefly explain place value on soroban and check understanding of the position marker <p>Task 4</p> <ul style="list-style-type: none"> • Pair activity: students use Worksheet 1 'Soroban Practice 1: Numbers 1-9' <p>Extension Activities</p> <ul style="list-style-type: none"> • 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	<p>To identify and represent two-digit numbers on a soroban.</p>	<p>Task 1</p> <ul style="list-style-type: none"> • Warm up: recap the previous lesson - clearing to 0 and numbers 1-9 • Explain how larger numbers are represented on the soroban <p>Task 2</p> <ul style="list-style-type: none"> • Check understanding by making 2 digit numbers together <p>Task 3</p> <ul style="list-style-type: none"> • Pair Activity: students practice making and reading 2 digit numbers <p>Task 4</p> <ul style="list-style-type: none"> • Students complete Worksheet 2a - 'Numbers above 10' • Call out numbers up to 99 for students to make on their soroban <p>Extension Activity</p> <ul style="list-style-type: none"> • Group Activity: In small groups, students take turns to choose a two digit number for the other students to make

3	<p>To use the soroban for addition</p>	<p>Task 1</p> <ul style="list-style-type: none"> • 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 <p>Task 2</p> <ul style="list-style-type: none"> • Recap how to clear the soroban and represent numbers • Show students how to use the beads correctly [<i>video in development</i>] • Introduce simple addition on the soroban*. Focus on correctly maneuvering the beads. <p>Task 3</p> <ul style="list-style-type: none"> • Introduce addition sums with 2 digit numbers*. Show an example then call out sums for students to complete on their own soroban. <p>Task 4</p> <ul style="list-style-type: none"> • Students to complete Worksheet 4a and 4b 'Adding numbers 1-9' and Adding numbers above 10 (Ones and Tens). Students can work in pairs. <p>*Refer to 'example sheet' for sums which do not involve carrying or breaking down the 5 bead.</p>
4	<p>To use the soroban for subtraction</p>	<p>Task 1</p> <ul style="list-style-type: none"> • Warm up: recap the previous lessons of adding on the soroban and remind students how to correctly move the beads. <p>Task 2</p> <ul style="list-style-type: none"> • Show students the sum $6+3=9$. • Write $9 - \square = \square$ 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.

		<p>Task 3</p> <ul style="list-style-type: none"> 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*. <p>Task 4</p> <ul style="list-style-type: none"> Students to complete Worksheet 5 – ‘Subtracting numbers’ Students can work in pairs. <p>*Refer to ‘example sheet’ for sums which do not involve carrying or breaking down the 5 bead.</p>
5	<p>Review and practice multiple operations on the soroban with fluency (addition and subtraction)</p>	<p>Task 1</p> <ul style="list-style-type: none"> Warm up: Give a multi-stage question using addition and subtraction. Give another question, this time using 2 digit numbers. <p>Task 2</p> <ul style="list-style-type: none"> Use the PowerPoint ‘Let’s Practice’ for more multi-stage addition sums <p>Task 3</p> <ul style="list-style-type: none"> 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. <p>Task 4</p> <ul style="list-style-type: none"> Group Activity: The students play number bonds matching with cards in small groups.