

image creation using an OHP

Teachers Notes

There are many ways of introducing mental calculation using images of the soroban. If you have never seen a particular image, then it is hard to picture it in your mind. You can't imagine someone's face if you have never seen the person, or at least a picture of the person, before.




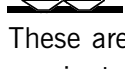
In order to visualise soroban beads, you need to look at them closely and have an idea of how the soroban works. Before starting this exercise using OHP, it is helpful if children have seen a soroban. However, you can also demonstrate its operation by drawing on a whiteboard and adding / subtracting simple numbers.

Once children have an idea of what a soroban is, you can move on to mental calculation by asking children to 'imagine' a number on a mental soroban and manipulate it. In the early stages it may be helpful to show the starter number on a soroban as an OHT. The following exercises are designed for this kind of class-based activity.

Teen numbers are particularly difficult for British children to visualise because they don't sound like the combination they come from; e.g. 'eleven' does not sound like 'ten and one'. Therefore it is necessary to practice these numbers more frequently when doing oral exercises.

Stage 1: Basic mental calculation with one additional number

- 1) Put the OHT with the starter numbers onto the OHP so that the whole class can see it.
 - 2) Ask the class, 'What number can you see under number 1?'
 - 3) The class should say the number that they can see.
 - 4) Then say, 'That's right. Now add / subtract _____ (e.g. a single or two-digit number).'
- Be careful to choose only numbers that do not require knowledge of number bonds 5 or 10.
e.g. If the starter number is 16, you can **add** the following numbers:

T U		
	1, 2, 3	10, 11, 12, 13,
	20, 21, 22, 23	30, 31, 32, 33
	50, 51, 52, 53	60, 61, 62, 63
	70, 71, 72, 73	80, 81, 82, 83

These are the ONLY numbers you can add at the basic level. Any other number, e.g. 40, would require too much mental movement of beads for beginners.

For **subtraction**, you could only use the following numbers: 1, 5, 6, 10, 11, 15, 16

Note: If you are unsure as to which numbers to use for exercises, it is best to prepare the questions in advance. Once you become more confident, you will be able to make them up as you go along. This applies to all stages.

- 5) Ask them for the answer.

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Stage 2: Basic mental calculation with two additional numbers

When children understand the basic principle and are able to add / subtract without much difficulty, you can get them to add / subtract 2 numbers from the number shown on the OHT before giving the final answer. Again, choose numbers that do not require too much mental bead movement.

e.g. the following 2 number combinations could be added/subtracted to the example 16:

$$16 + 1 + 2$$

$$16 + 22 + 1$$

$$16 + 71 + 12$$

$$16 - 5 - 1$$

$$16 - 10 - 5$$

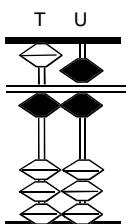
$$16 - 5 - 11$$

Stage 3: Basic mental calculation with more than 2-digit numbers

Use the same principle as described in Stages 1 & 2 with up to 4-digit numbers. Practicing 4-digit numbers is very important for everyday use e.g. when using money £24.32. Make OHTs in advance similar to the sample, this time using 3- and 4-digit numbers.

Stage 4: Number bond 5

Now you can choose numbers that require a bit more mental bead movement. Start with adding / subtracting only one number that requires the ability to calculate with number bond 5. Staying with our example '16', here are some possible sums:



Addition: 40, 41, 42, 43

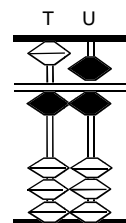
Subtraction: 2, 3, 4, 12, 13, 14

Other numbers are also possible e.g. add 51, but they do not require number bond 5

Again, you can make the exercises more complex by adding or subtracting 2 numbers before asking for an answer, or by expanding the number of digits to 4.

Stage 5: Number bond 10

Now you can choose numbers that exclusively require knowledge of number bond 10. Staying with our example '16', here are some possible sums:



Addition: 4, 5, 9, 15, 19, 25, 29, 55, 59, 65, 69, 75, 79

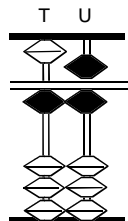
Subtraction: 7, 8, 9

Again, you can make the exercises more complex by adding or subtracting 2 numbers before asking for an answer, or by expanding the number of digits to 4

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Stage 6: Number bonds 5 and 10

Here you can choose almost any combination of numbers. If you only want to use numbers requiring the use of both number bonds 5 and 10, then here are some examples.



Addition: 6, 7, 8, 35, 36, 37, 38, 44, 45, 46, 47, 48, 49, 54, 55, 56, 57, 58, 66, 67, 68, 76, 77, 78

Subtraction: for this example, there is no number that requires knowledge of both number bonds 5 and 10.

Again, you can make the exercises more complicated by adding or subtracting 2 numbers before asking for the answer, or by expanding the number of digits to 4.

Exercises to practice making questions for pupils

Use the soroban drawings below and do the 4 exercises for each.

Exercise 1:

Which numbers can be added / subtracted to the numbers shown for Stages 1 - 3 (i.e. no knowledge of number bonds required)?

Exercise 2

Which numbers can be added / subtracted to the numbers shown for Stage 4 (i.e. knowledge of number bond 5 required)?

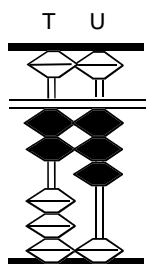
Exercise 3

Which numbers can be added / subtracted to the numbers shown for Stage 5 (i.e. knowledge of number bond 10 required)?

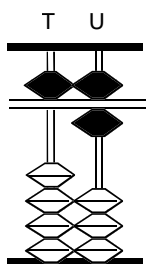
Exercise 4

Which numbers can be added / subtracted to the numbers shown for Stage 6 (i.e. knowledge of both number bond 5 AND 10 required)?

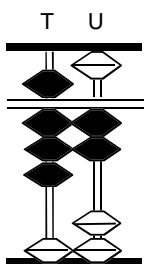
a)



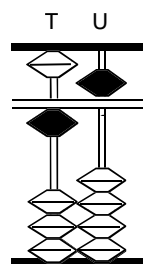
b)



c)



d)



<p>①</p>	<p>②</p>	<p>③</p>	<p>④</p>	<p>⑤</p>
<p>⑥</p>	<p>⑦</p>	<p>⑧</p>	<p>⑨</p>	<p>⑩</p>