Structured apparatus

Structured apparatus gives a visual and tactile approach which reinforces the underlying concepts of place value and multiplication as repeated addition. It leads naturally to the formal written method of 'short' multiplication by a single digit. The apparatus comprises small cubes (U), rods (T) equal in length to ten cubes and, later, squares (H) equal in size to ten rods placed side by side. (Pieces taken from Cuisenaire and Dienes apparatus are a useful resource.)

Manipulation of the apparatus is discussed and gives understanding to the recording required for the written method of 'short' multiplication by a single digit.

In brief, discussion → action → written record.

This example for 4 × 23 illustrates Steps 2 and 3: Two-digit × **one**-digit (carrying units to tens).

Although many pupils may well be able to do this multiplication mentally, the aim here is to begin to understand the formal written method which will work for harder multiplications not carried out mentally.

The teacher's words are in italics; the pupils' answers are in square brackets.

Let us work out 4 × 23. We need 4 lots of 23.

We can use ten-rods and unit-cubes to start with.

How many rods and cubes do we need for 23?
[2 ten-rods and 3 unit-cubes]

We now need 4 lots of 23.

How many are 4 lots of 3? [12]

How many are 4 lots of 20? [80]

	2 3
	2 3
	2 3
	+ 2 3
	9 2

We can see that 4 lots of 23 add up to make 92.

But we have only got 8 ten-rods.

Where does the extra ten-rod come from?
[We have 12 units which make the one extra ten-rod and leave 2 units.]

Let's see how to write this down more quickly.

T	U
2	3
×	4
	2

The first step *is '4 times 3 units' which gives 12 units.*

We write the extra ten in the T column under the answer line, where it waits for more tens to come. The 2 units go straight into the U column of the answer.

The second step *is '4 times 2 tens', which is 8 tens.*

We also have the extra 1 ten, making 9 tens altogether. This 9 is written in the T column of the answer.

T	U
2	3
×	4
9	2

So the answer is 92.

This working is quicker than just adding the four 23s together.