Structured apparatus

Structured apparatus gives a visual and tactile approach which reinforces the underlying concepts of place value and subtraction and leads naturally to the formal written method. The same apparatus is used as for addition. (Pieces taken from Cuisenaire and Dienes apparatus are a useful resource.)

The same baseboards can also be used as for addition, although the answer now appears on the top row of the baseboard rather than the third row as in addition. As before, the baseboards can be used in a whole-class introductory discussion and for pupils' own initial work where needed.

Discussion of the subtraction and the movement of the apparatus give understanding to the recording required for the formal written method. In short, discussion → action → written record.

This example is taken from Step 3: Three-digit subtraction (exchanging 1 ten for 10 units).

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

Let us subtract 148 from 573. We can write "573 – 148".

Can anyone work this out in their head?

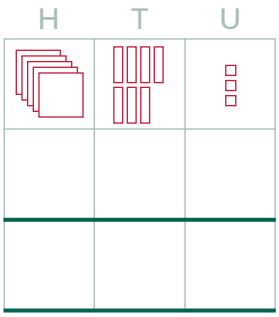
It doesn't matter if you can't, because we are going to work it out in a different way.

How many hundred squares, ten rods and unit cubes does 573 need? [5 squares, 7 rods and 3 units]

Let's place them on the top row of the baseboard.

We write

H	T	U
5	7	3



We now want to subtract by taking 148 away from 573.

Let's start with the units. But we cannot – we want to take away 8 units but there are only 3 there.

We need more units.

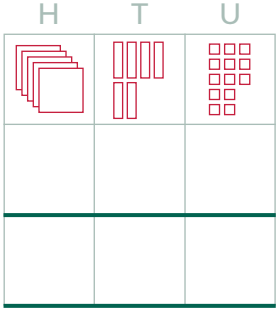
We can make more units by changing a ten-rod into 10 units.

How many units do we now have? [3 + 10 = 13 units]

Take away 8 of them onto the second row. How many are left? [5 units are left]

We write

	H	T	U
	5	$^{6}\cancel{7}$	$^{1}3$
–			8
			5



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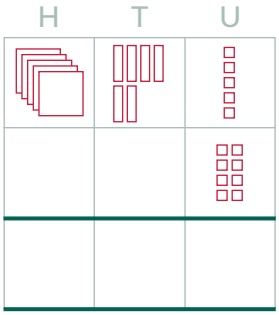
Structured apparatus continued

We now want to take away 4 tens. We have 6 tens available.

So, how many tens are left after we take away 4 of them? [2 tens are left]

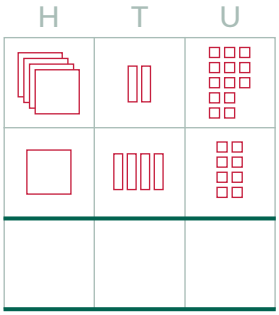
We now want to take away 1 hundred. We have 5 hundreds.

How many hundreds are left after we take away 1 of them? [4 hundreds are left]



We write

	H	T	U
	5	~~6~~ 7	~~1~~ 3
−	1	4	8
	4	2	5



What is the final answer after taking away 148? [Four hundred and twenty five]

This answer can be checked by using addition as the inverse operation of subtraction.

If we add together the answer with what was taken away, what number do we get? Let's find out.

We check by adding 425 and 148 together. We work upwards.

Add the units. [5 + 8 = 13 = 1 ten and 3 units]

Add the tens. [2 + 4 + the extra 1 we have just made = 7]

Add the hundreds. [4 + 1 = 5]

Does the check work? Is the subtraction correct? [The check gives 573. The subtraction is correct]

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