# Structured apparatus

Structured apparatus gives a visual and tactile approach that reinforces the underlying concepts of place value and division. It leads naturally to the formal written method of short division by a single digit. The apparatus comprises small cubes (U), rods (T) and, later, squares (H). Pieces taken from Cuisenaire and Dienes apparatus are a useful resource. Discussion of the action leads to understanding the written record.

Using baseboards for division is only sensible when dividing by a small number, say 2, 3 or 4.
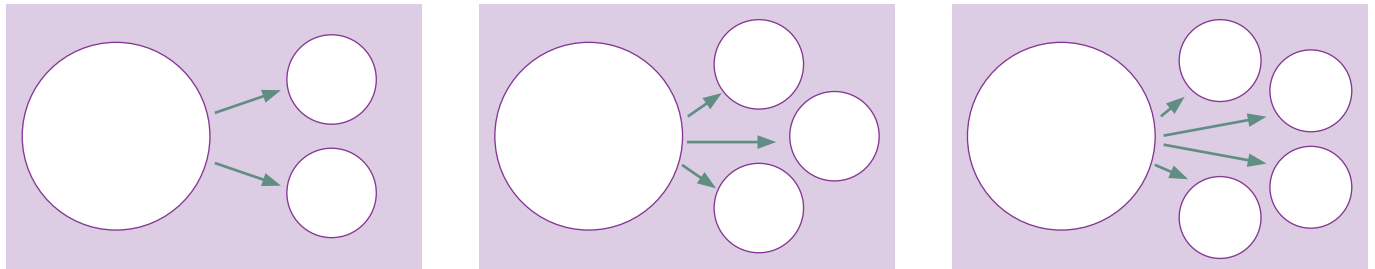
The example 75 ÷ 3 is taken from Step 3: Two-digit ÷ one-digit (carrying a ten).

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

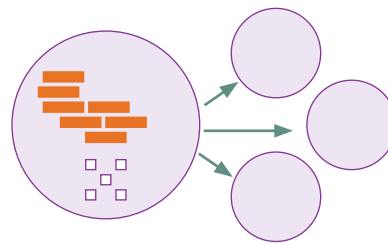*We want to divide 75 into 3 equal groups. We write*   T U

$$3\overline{)7\ 5}$$

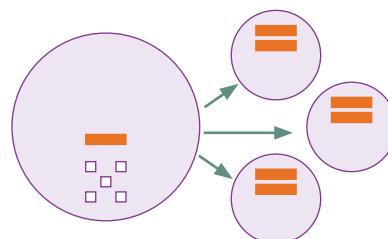*Which baseboard do we choose?*   [The one with 3 small circles.]

How many ten-rods and unit-cubes do I need for

75 and where do I put them?   [7 rods and 5 cubes go in the large circle.]

When I divide the ten-rods into 3 equal groups,

how many can I put in each small circle?   [2 ten-rods in each small circle]

Structured apparatus continued

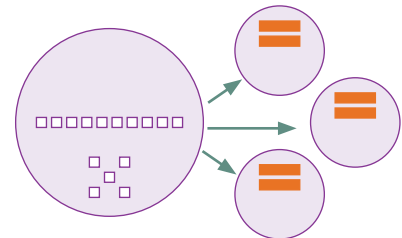*How many ten-rods have I left over and how many unit cubes will it make?*

[1 ten-rod is left. It makes 10 unit cubes.]

How many unit-cubes have I got altogether?
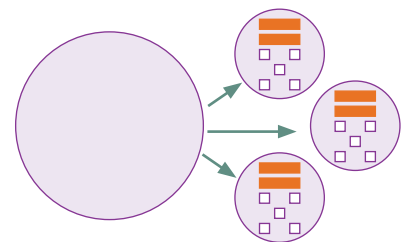
[10 + 5 = 15 cubes]

We write

T U

2

3) 7 ¹5

When I divide the unit-cubes into 3 equal groups, how many can I put in each small circle?

[5 units in each small circle]

Have we used all the unit-cubes?

[Yes]

We have divided 75 into 3 equal groups.

What number is in each group?   [25]

So what is the answer for 75 ÷ 3?   [25]

We write

T U

2 5

3) 7 ¹5

This answer can be checked by using multiplication as the inverse operation of division, as follows.

We have three equal groups of 25.

If we bring the three 25s back into the large circle, what number is there in the large circle?   [75]

75 is the number we started with.

We have 3 lots of 25 making 75. We have multiplied 25 by 3. We can write 3 × 25 = 75.

So 3 × 25 = 75 brings three 25s together and 75 ÷ 3 divides 75 into three 25s.

*Multiplication is doing the opposite (**the inverse**) of division.*

We can always check the answer to a division using multiplication.