

Parent
Mathematics
Workshops
2.2.16

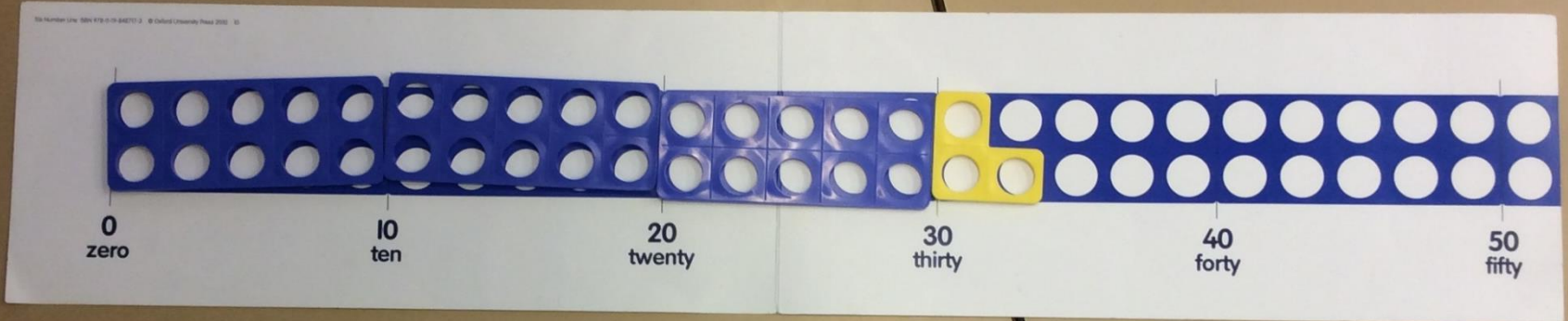
How we teach addition.

Mental arithmetic methods: addition.

$$32 + 41 =$$

Numicon: addition

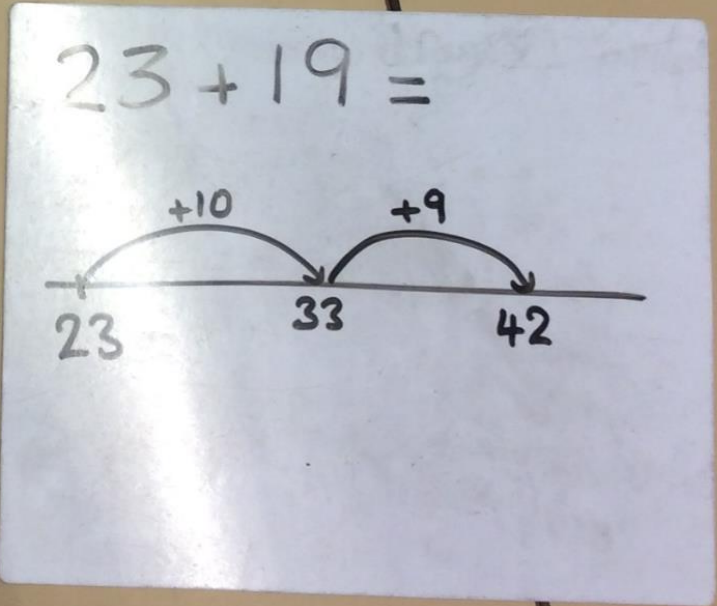
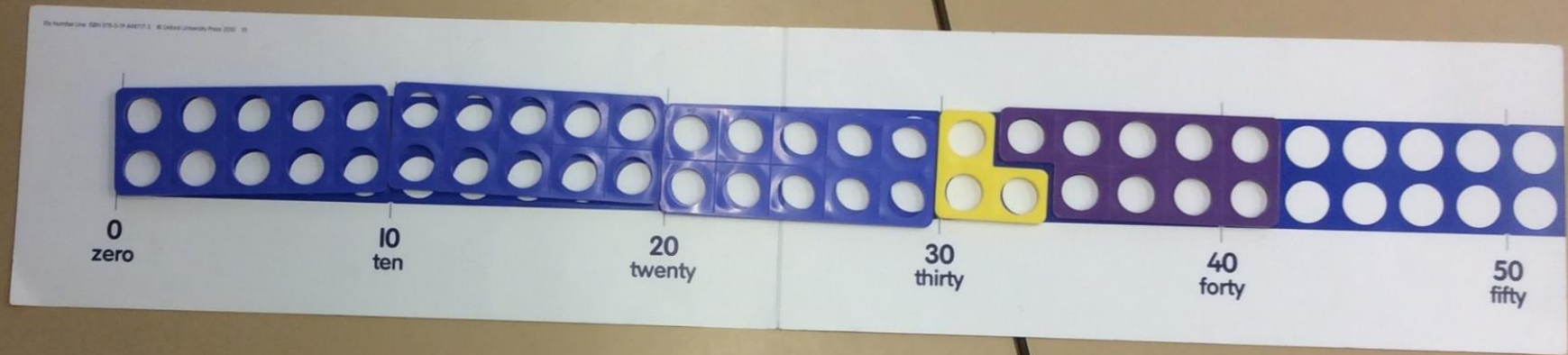
The image shows a Numicon number line and a tray of blocks. The number line is marked from 0 to 50 in increments of 10, with labels: 0 zero, 10 ten, 20 twenty, 30 thirty, 40 forty, and 50 fifty. A yellow Numicon block representing the number 23 is placed on the line, starting at the 20 mark and extending to the 23rd hole. Below the number line is a white sticky note with the handwritten equation $23 + 19 =$. Underneath the equation is a vertical addition grid with a horizontal line and the number 23 written below it. In the bottom left corner, there is a tray containing various colored Numicon blocks: green, blue, pink, yellow, and orange.



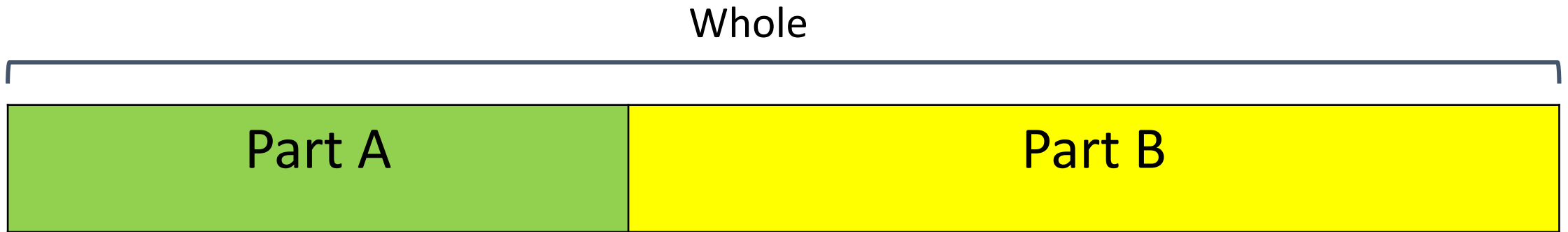
$$23 + 19 =$$

A number line diagram illustrating the addition of 10 to 23. The number 23 is marked on the left, and 33 is marked on the right. A curved arrow starts at 23 and points to 33, with the label "+10" written above the arrow.





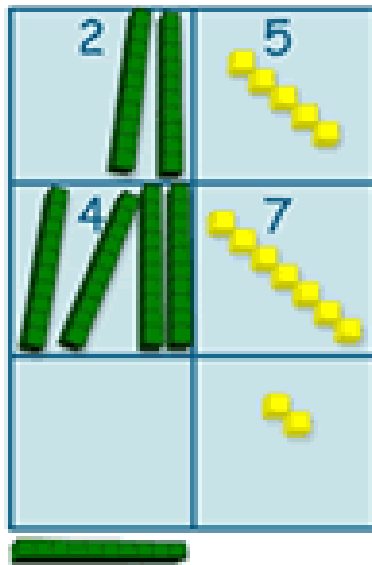
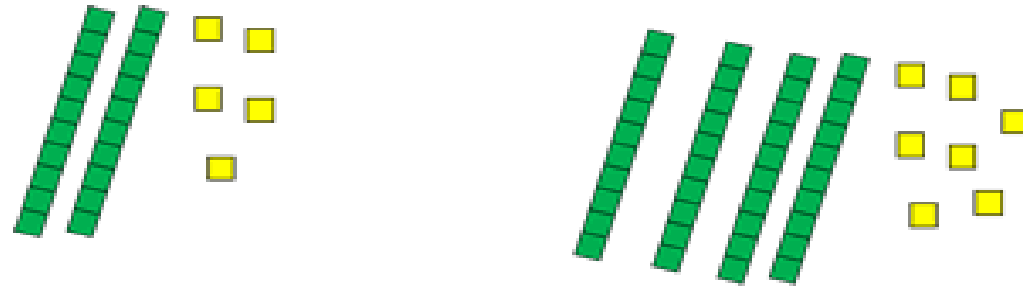
Part- whole addition / subtraction



There are 45 children at St John's Infants and 175 at Springfield Juniors.
How many children are there altogether?

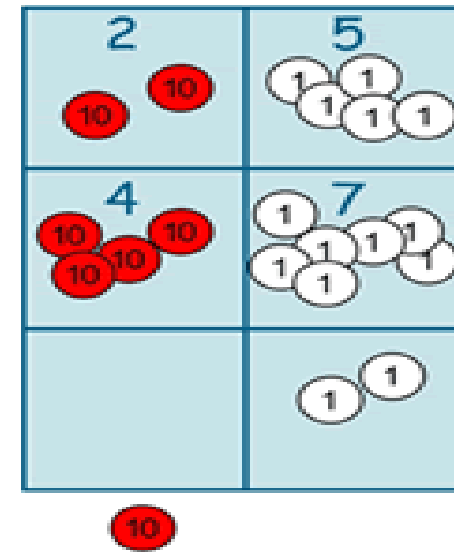
Singapore Bar (adapted from Erie 2 Math, 2012).

$$25 + 47$$



leading to

		2	5	
		+	4	7
			7	2
				1



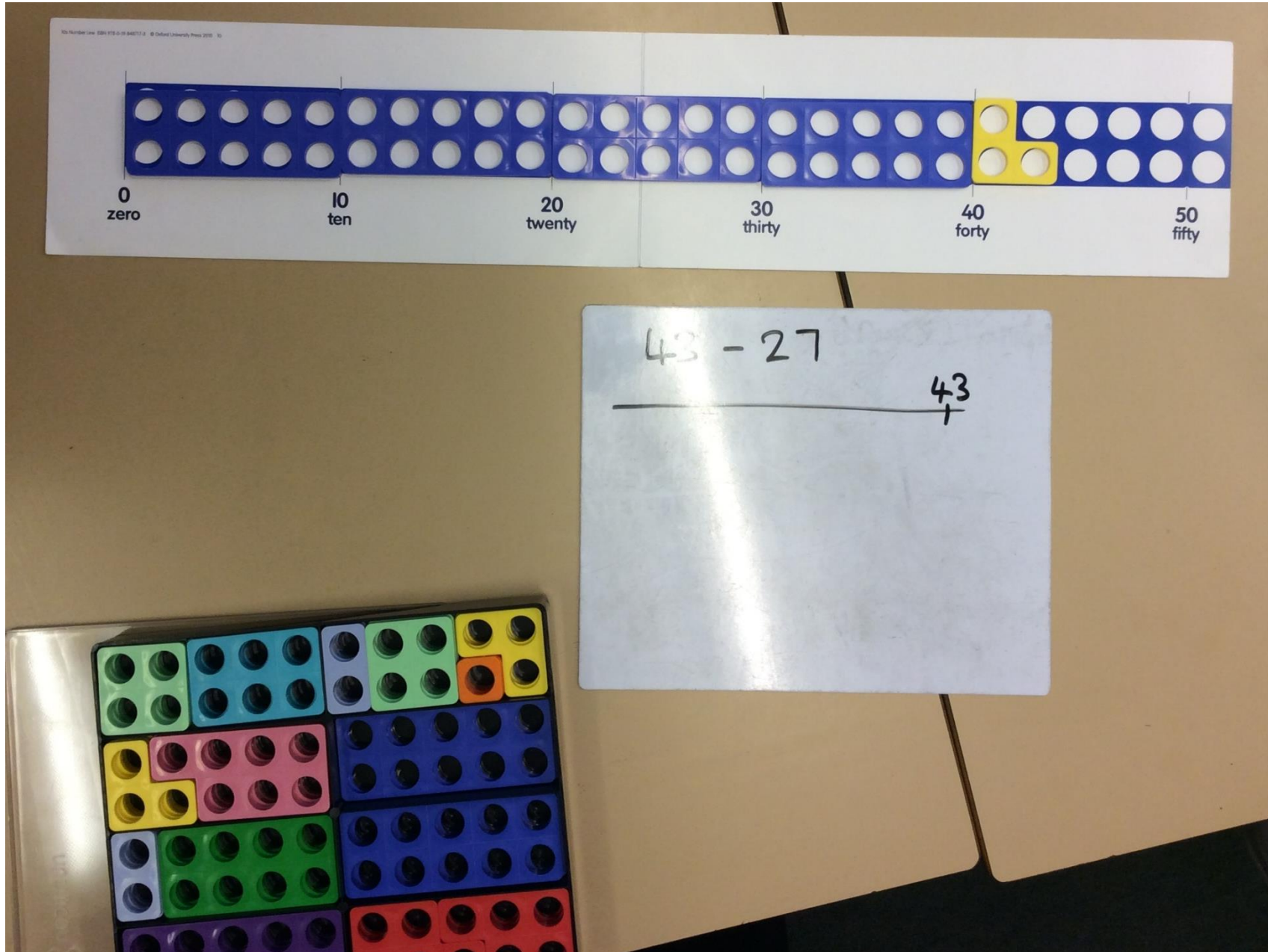
How we teach subtraction.

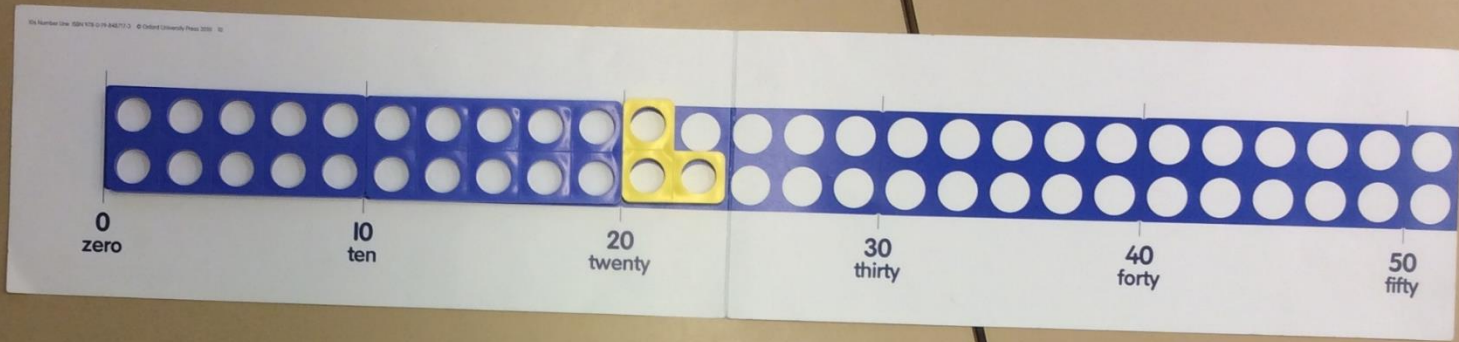
Mental arithmetic methods: subtraction.

$$51 - 38 =$$



Numicon: subtraction

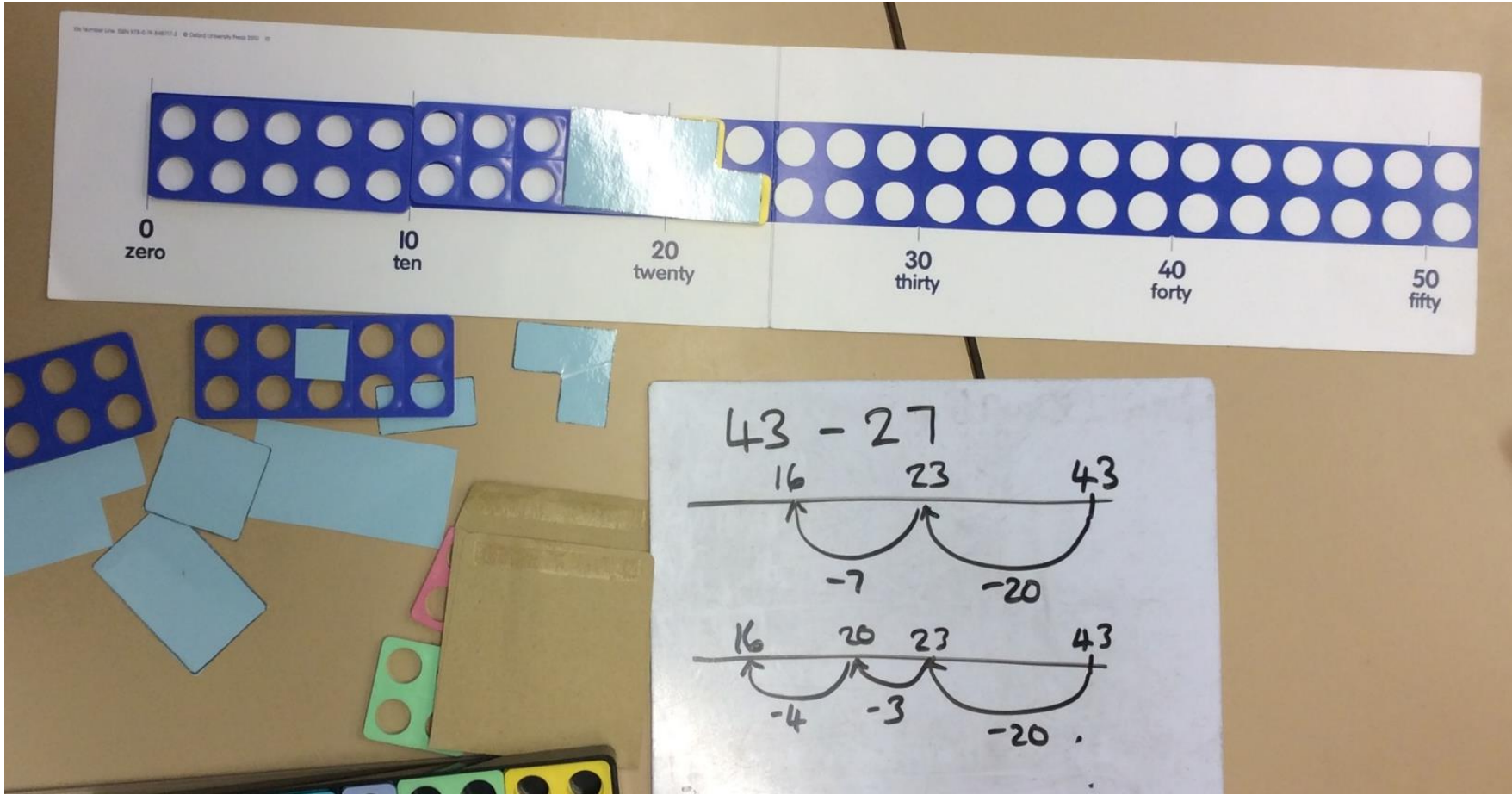




$$\begin{array}{r} 43 - 27 \\ \hline 23 \end{array}$$

A handwritten subtraction problem on a white card. The problem is $43 - 27$. A horizontal line is drawn under the numbers. Below the line, the number 23 is written. A curved arrow starts from the 3 in 43 and points to the 2 in 23. Below the arrow, the number -20 is written.





©4 Number Line 500 979-0-16 348777 © Oxford University Press 2010

0 zero 10 ten 20 twenty 30 thirty 40 forty 50 fifty

$$\begin{array}{r} 43 - 27 \\ \hline \end{array}$$

16 23 43

-7 -20

$$\begin{array}{r} 43 - 27 \\ \hline \end{array}$$

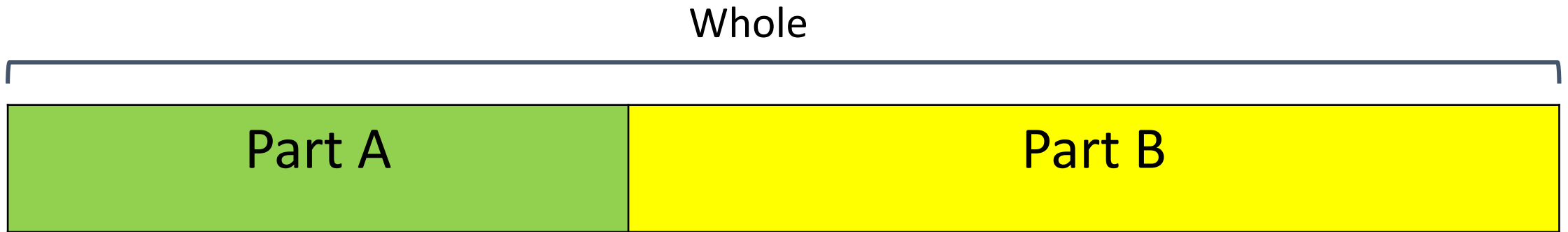
16 20 23 43

-4 -3 -20

A number line from 0 to 50 is shown, with major markings at 0 (zero), 10 (ten), 20 (twenty), 40 (forty), and 50 (fifty). The number line is marked with blue blocks, and a green block is placed at 30. To the left of the number line are two stacks of blue base ten blocks. Below the number line, a subtraction diagram shows 228 and 236 on a horizontal line, with a curved arrow pointing from 236 to 228 and the label -8 below it.

A number line from 0 to 50 is shown, with major markings at 0 (zero), 10 (ten), 20 (twenty), 40 (forty), and 50 (fifty). The number line is marked with blue blocks, and a green block is placed at 30. To the left of the number line are two stacks of blue base ten blocks. Below the number line, a subtraction diagram shows 228 and 236 on a horizontal line, with a curved arrow pointing from 236 to 228 and the label -8 below it.

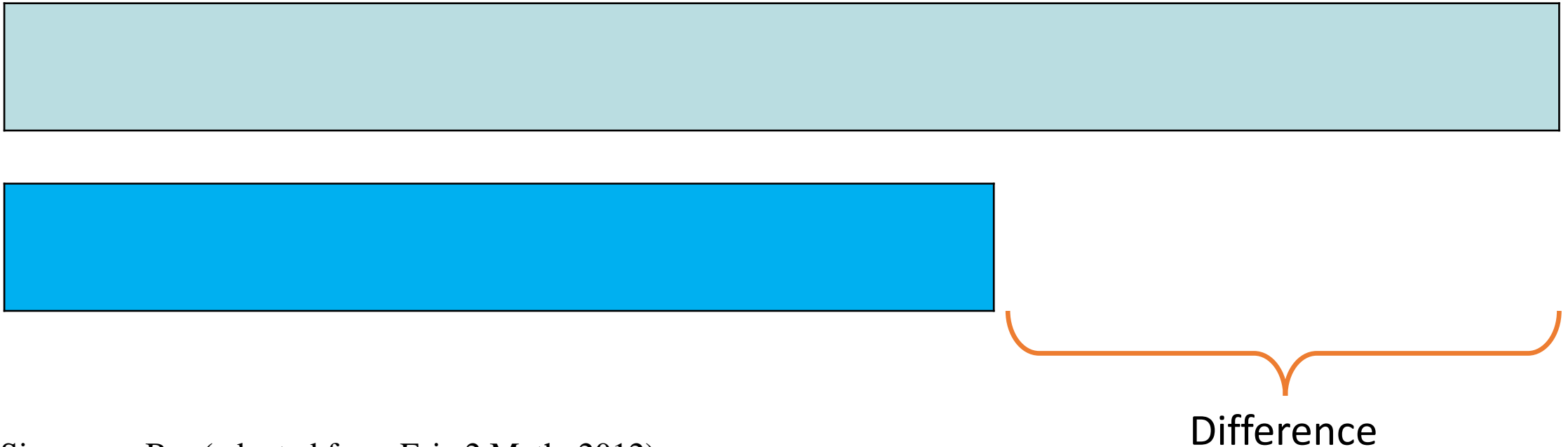
Part- whole addition / subtraction



Jack has £250. He spends £70. How much does he now have?

Comparison: subtraction

Martin has saved £6.78. Matthew has saved £4.69. How much more money does Martin have?

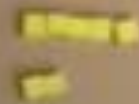


Singapore Bar (adapted from Erie 2 Math, 2012).

H

T

O



$$\begin{array}{r} 427 \\ - 338 \\ \hline \\ \hline \end{array}$$

H

T

O



$$\begin{array}{r} 487 \\ - 338 \\ \hline \hline \end{array}$$



H

T

O



$$\begin{array}{r} 487 \\ - 338 \\ \hline 9 \end{array}$$

H

T

O



Handwritten calculations on a piece of graph paper:

3	11	
✓	8	17
- 3	3	8
<hr/>		
		9
<hr/>		

H

T

O



3	1	
4	8	¹ 7
3	3	8
<hr/>		
	8	9
<hr/>		

H

T

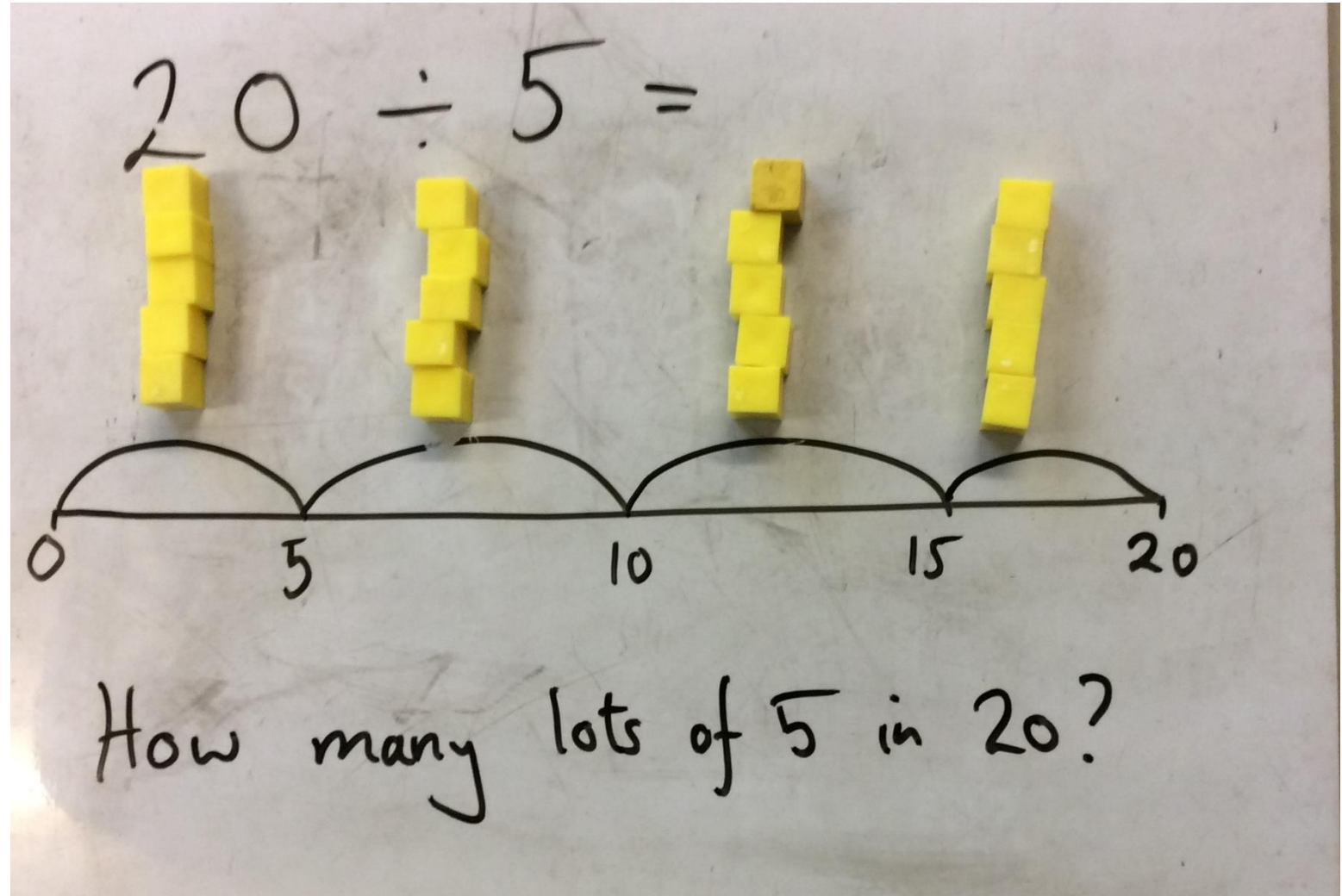
O



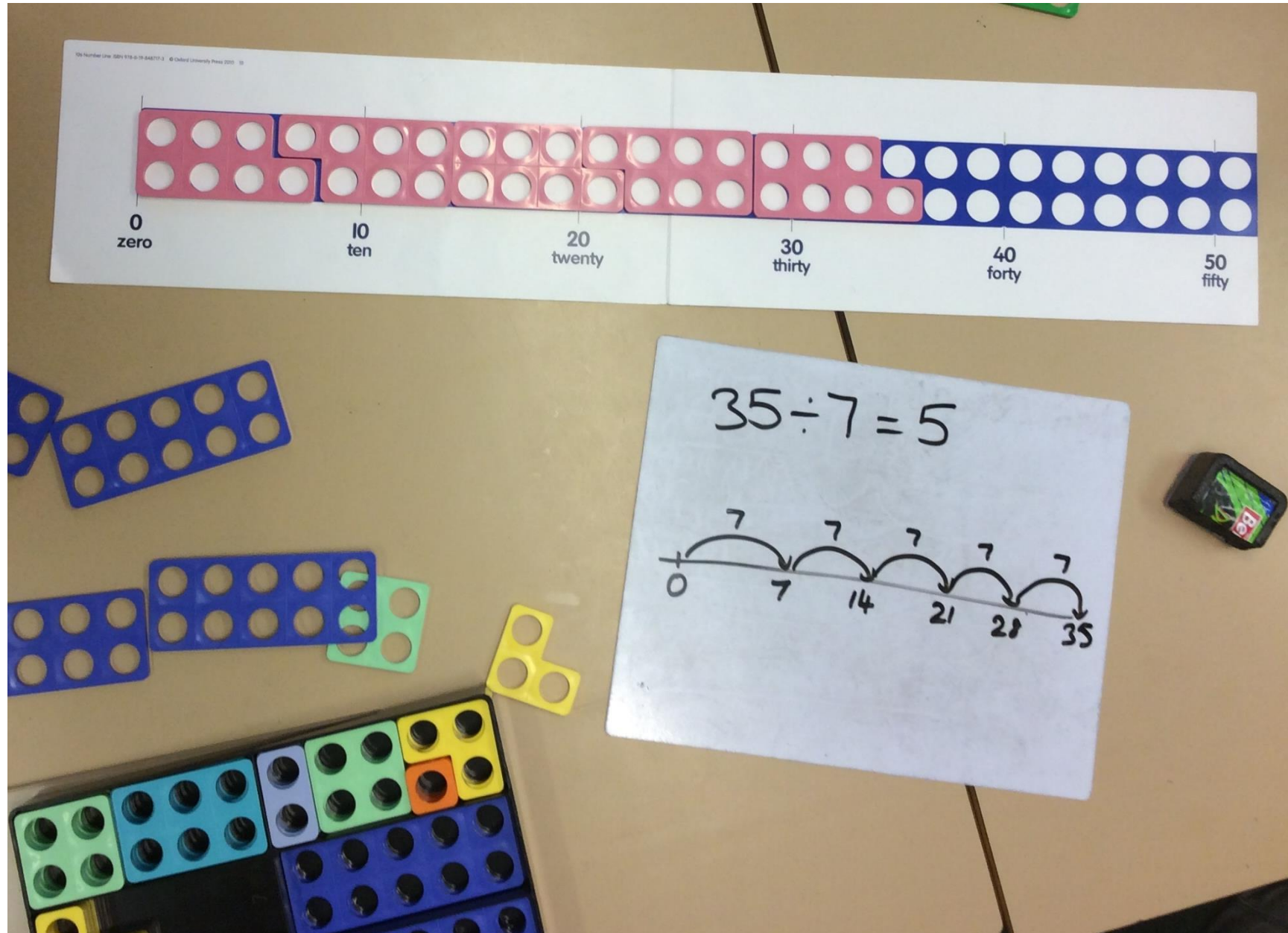
3	11	
4	8	17
- 3	3	8
<hr/>		
	8	9
<hr/>		


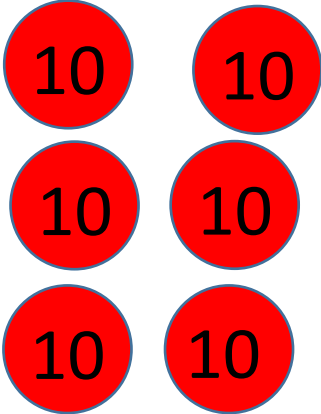
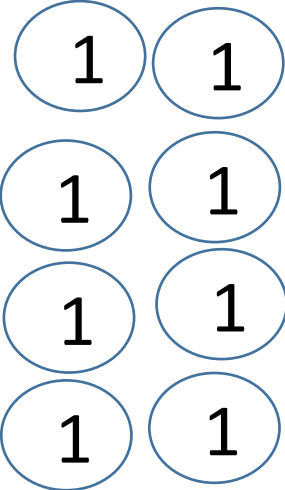
How we teach division.

Using diennes for division
Use with number lines



Numicon: division



100s	10s	1s
		

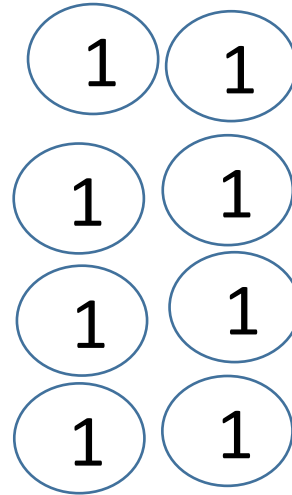
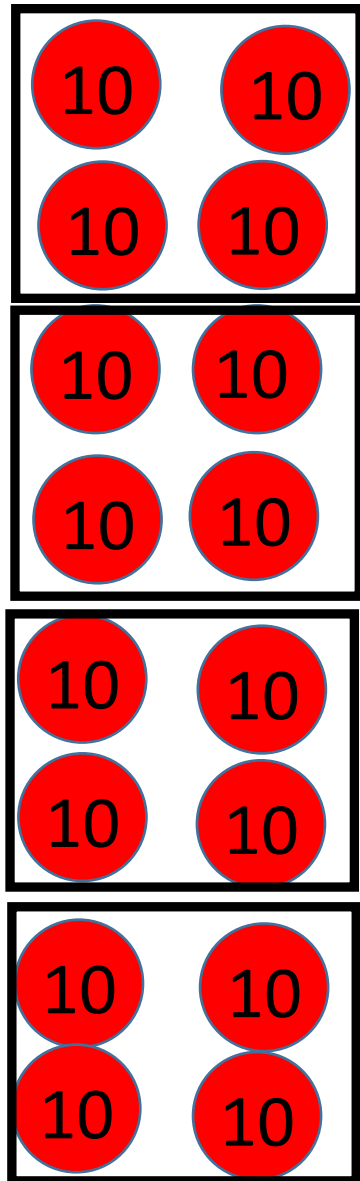
$$4 \overline{) 168}$$

Idea for short division with place value counters adapted from Jane Gill's INSET on 16th November at Lowe's Wong Juniors.

100s

10s

1s



$$4 \overline{) \overset{4}{\cancel{1}6}8}$$

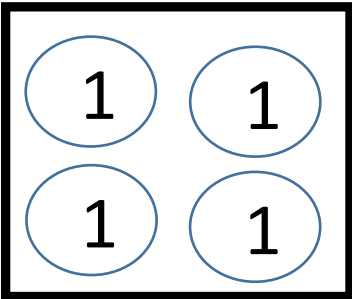
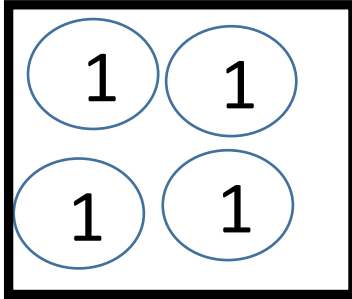
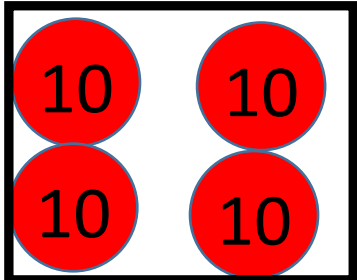
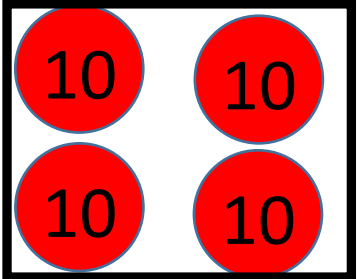
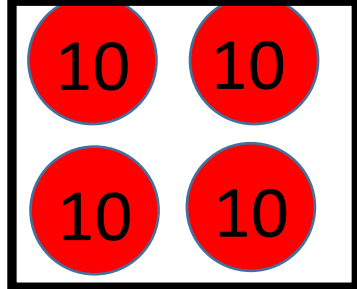
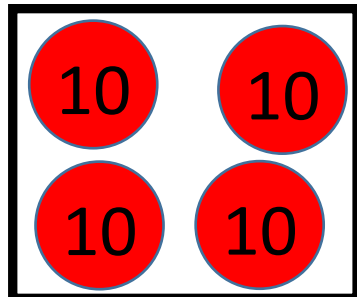
Exchange the 100 for 10 tens.

How many groups of 4 can be made with 16 tens?

100s

10s

1s



$$4 \overline{) 168}$$

The diagram shows a long division problem. The divisor is 4, and the dividend is 168. The quotient is 42. The first step of the division is shown with a 4 written above the 16, and a 4 written below the 16, which is then crossed out with a diagonal line. The next step shows a 2 written above the 8, and an 8 written below the 8, which is also crossed out with a diagonal line.

How many groups of 4 can be made with 8 ones?

$$260 \div 5 =$$

$$147 \div 7 =$$

$$1326 \div 6 =$$

$$5256 \div 4 =$$

$$2532 \div 6 =$$

Here are a few to have a go at.

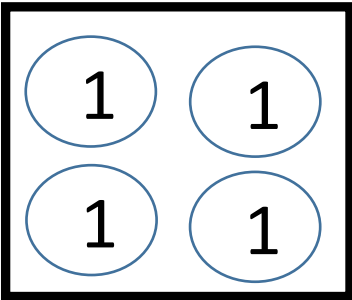
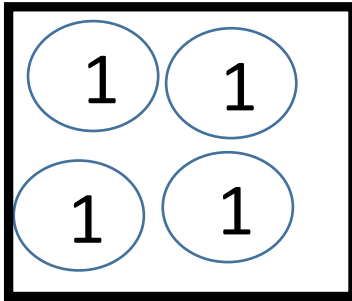
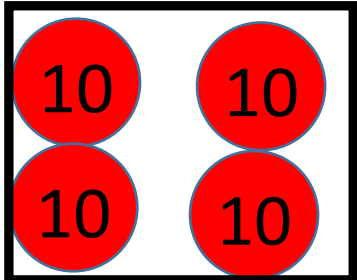
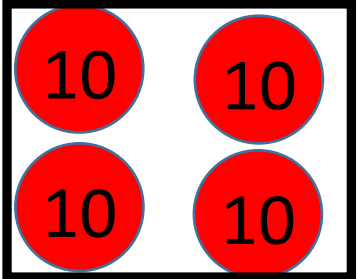
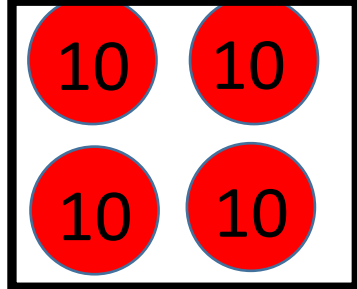
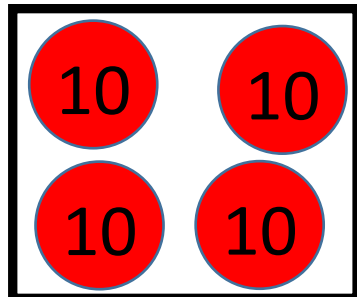
When designing questions for children, be careful, otherwise they can end up exchanging 4 tens for 40 ones etc....can take a while!

100s

10s

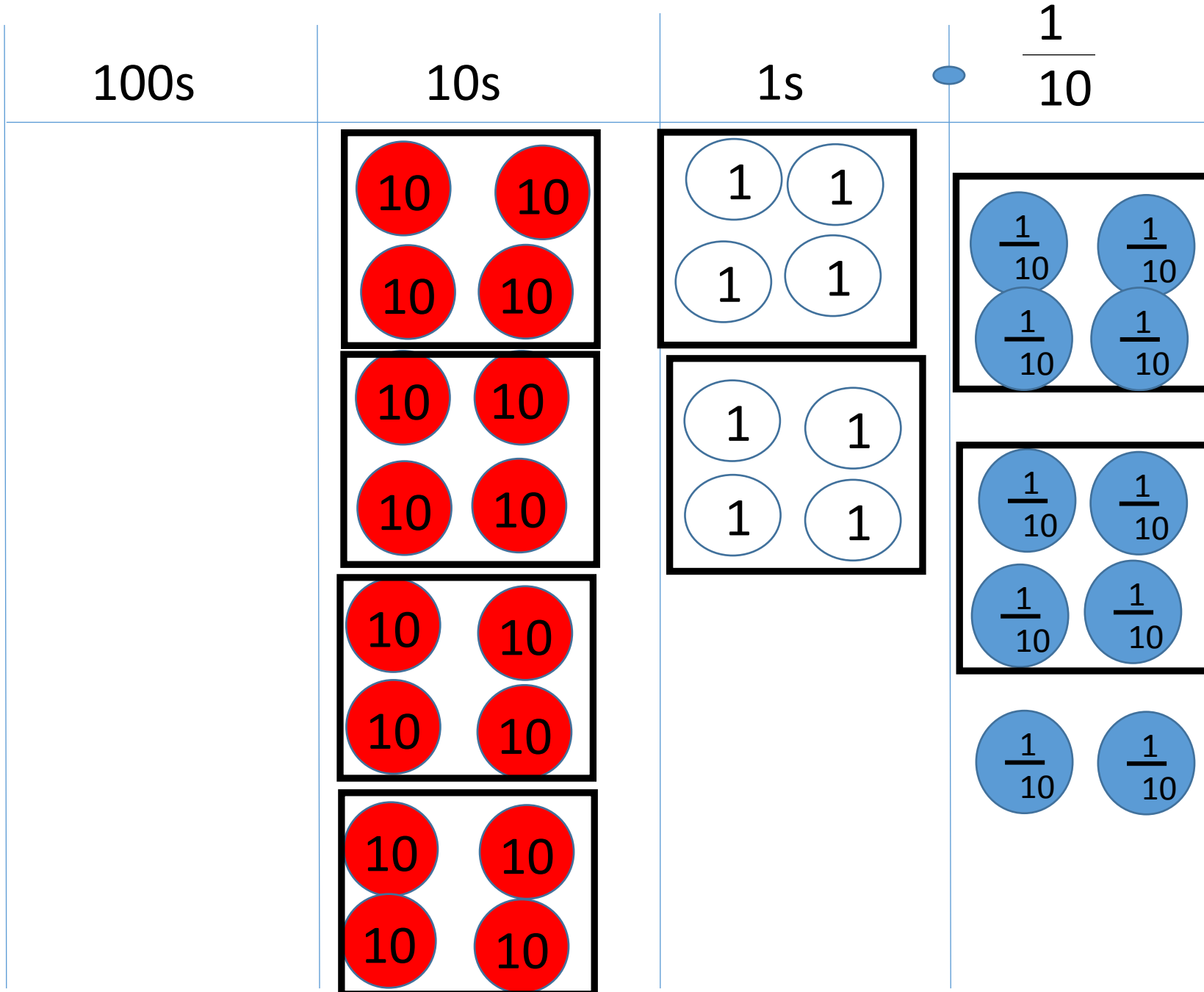
1s

$\frac{1}{10}$



$$4 \overline{) \cancel{1} 69} \begin{array}{r} 42 \\ \end{array}$$

How many groups of 4 can be made with 9 ones?



$$4 \overline{) 169.10} \begin{array}{r} 42 \cdot 2 \\ \underline{16} \\ 9 \\ \underline{8} \\ 10 \end{array}$$

Exchange the one
For 10 tenths.

How many groups of
4 can be made with
10 tenths?

100s

10s

1s

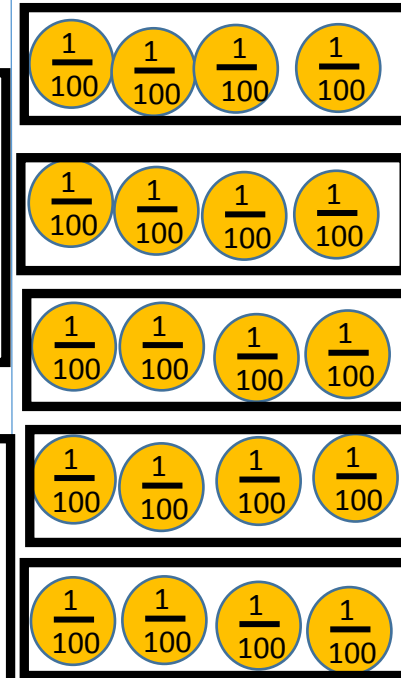
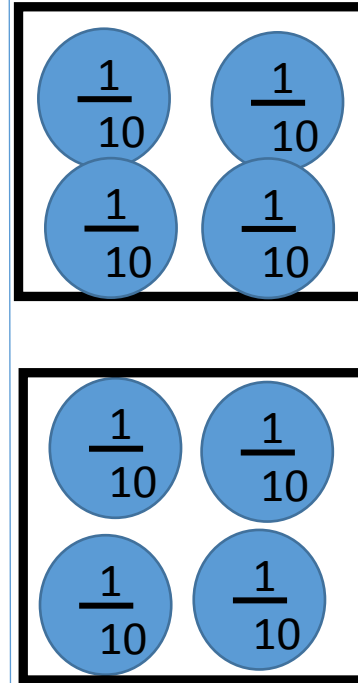
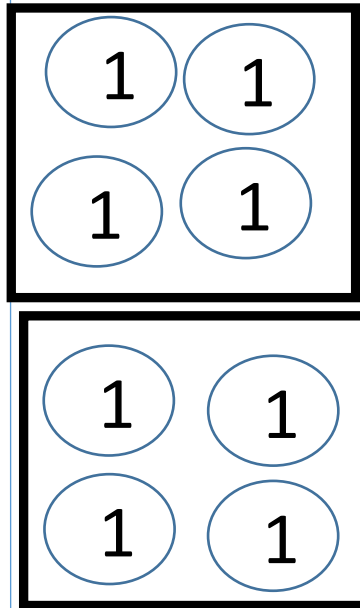
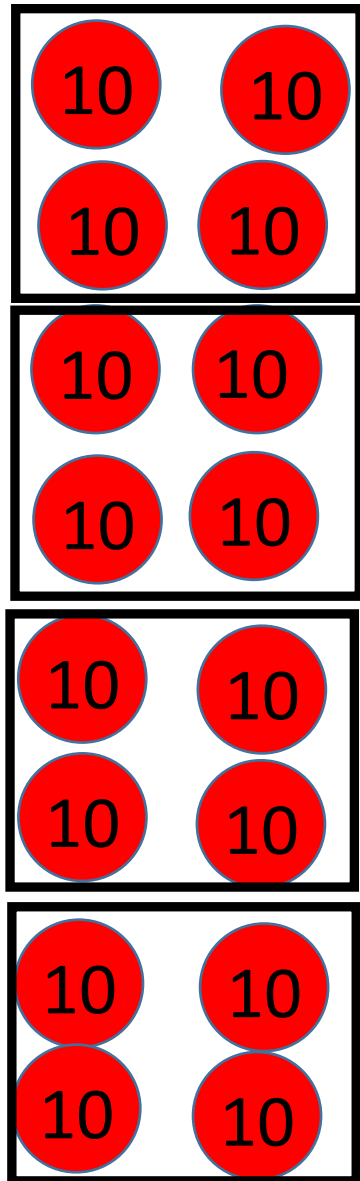
$\frac{1}{10}$

$\frac{1}{100}$

Language after decimal point.

Exchange the two tenths 20 hundredths.

How many groups of 4 can be made with 20 hundredths?



Forty two and 25 hundredths.

Or

Forty two and 2 tenths and 5 hundredths.

$$4 \overline{) 169.25} = 42.25$$

Long division

432 ÷ 15 becomes

$$\begin{array}{r}
 28 \text{ r } 12 \\
 15 \overline{) 432} \\
 \underline{30 } \\
 132 \\
 \underline{120} \\
 12
 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$\begin{array}{r}
 28 \\
 15 \overline{) 432} \\
 \underline{30 } \quad 15 \times 20 \\
 132 \\
 \underline{120} \quad 15 \times 8 \\
 12
 \end{array}$$

$$\frac{\cancel{12}}{\cancel{15}} = \frac{4}{5}$$

Answer: $28 \frac{4}{5}$

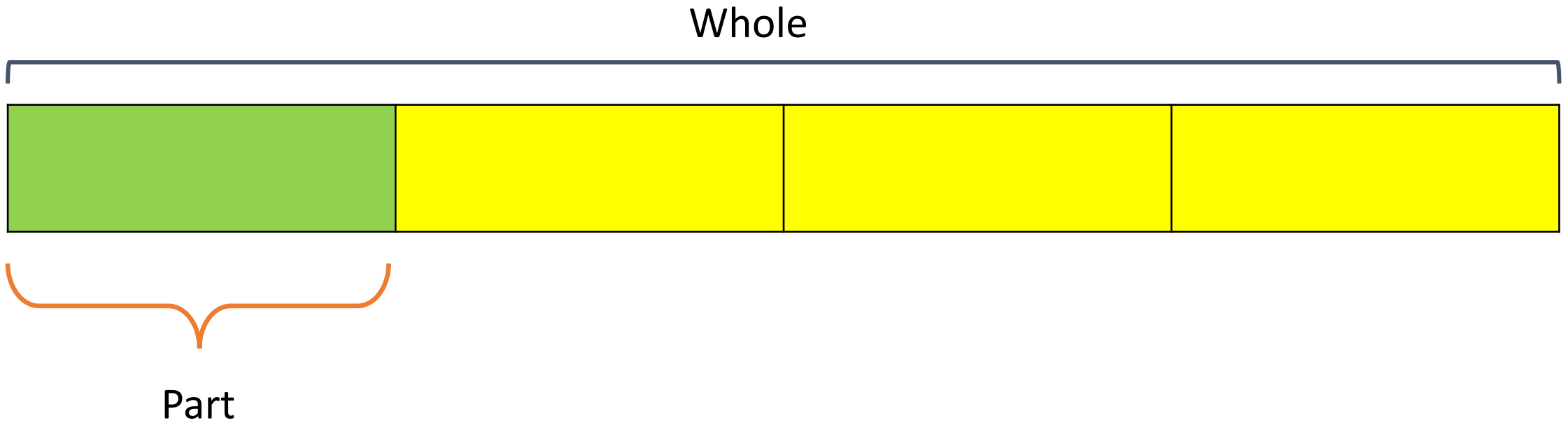
432 ÷ 15 becomes

$$\begin{array}{r}
 28 \cdot 8 \\
 15 \overline{) 4320} \\
 \underline{30 } \quad \downarrow \\
 132 \\
 \underline{120} \quad \downarrow \\
 120 \\
 \underline{120} \quad \downarrow \\
 0
 \end{array}$$

Answer: 28.8

Exemplification from National Curriculum
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Part-whole multiplication / division / fractions

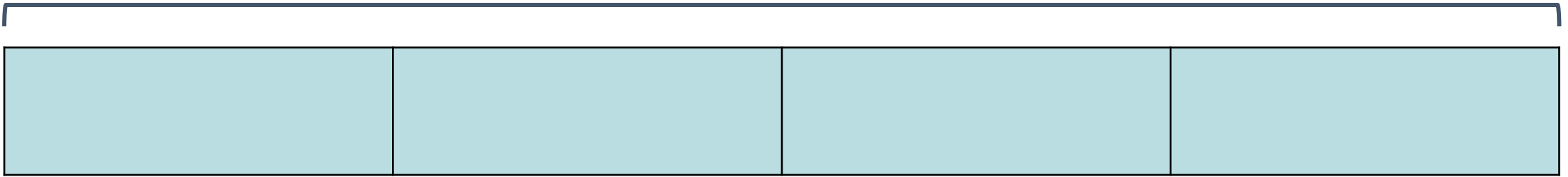


Singapore Bar (adapted from Erie 2 Math, 2012).

Comparison: multiplication / division

- If eight apples cost £2, how much would two apples cost?

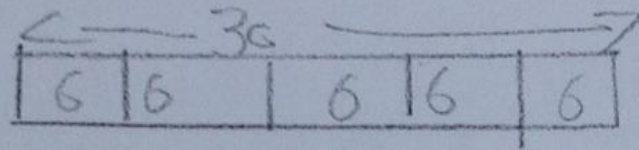
Larger quantity



Smaller quantity

9) Mr Smith had a piece of wood that measured 30 cm. He cut it into 5 equal pieces. How long was each piece?

$$\begin{array}{r} 06 \\ 5 \overline{) 30} \end{array}$$



ANS = 6 /

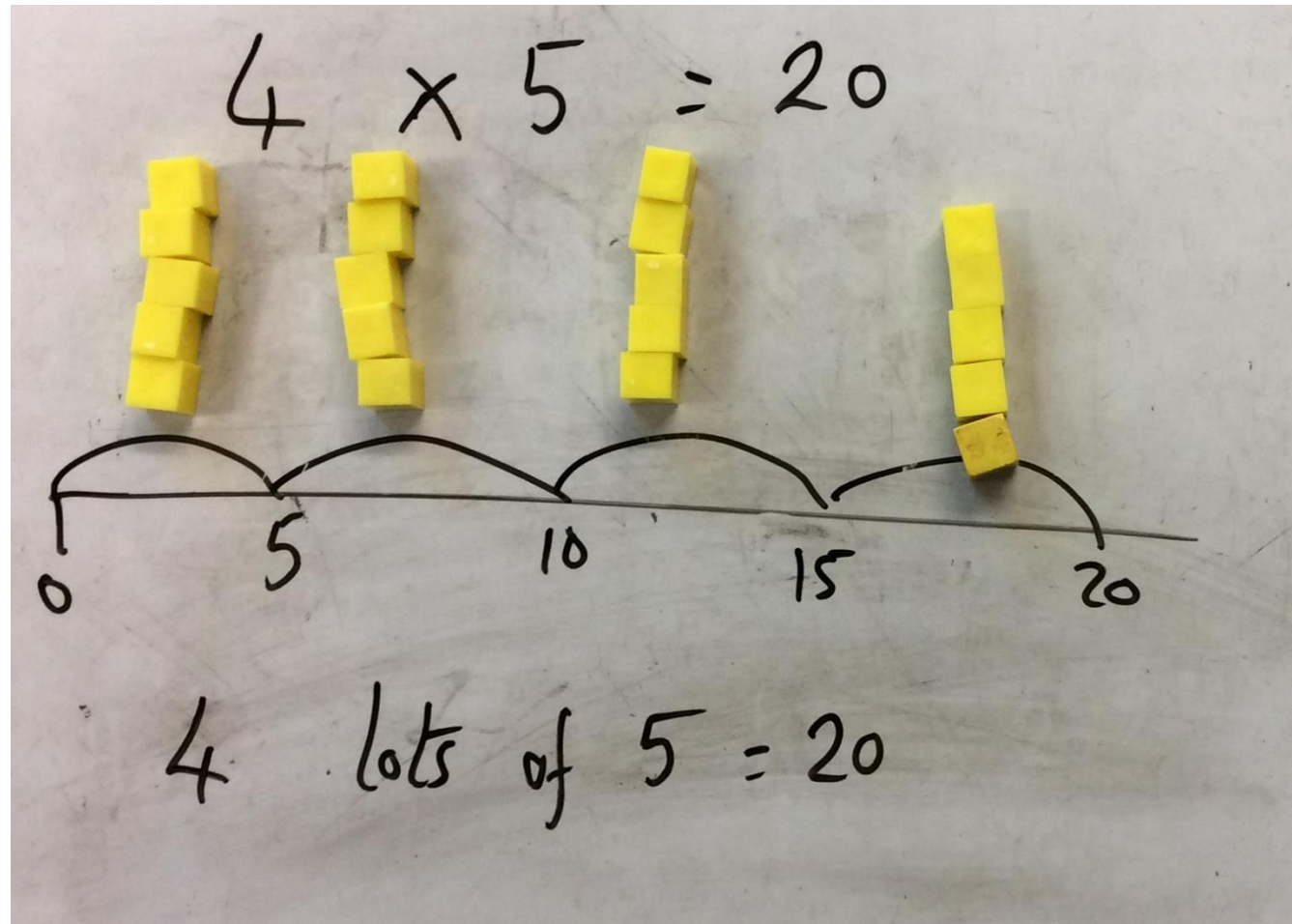
14) $\frac{3}{10}$ of a number is 15. What is the whole number?

30% = 15

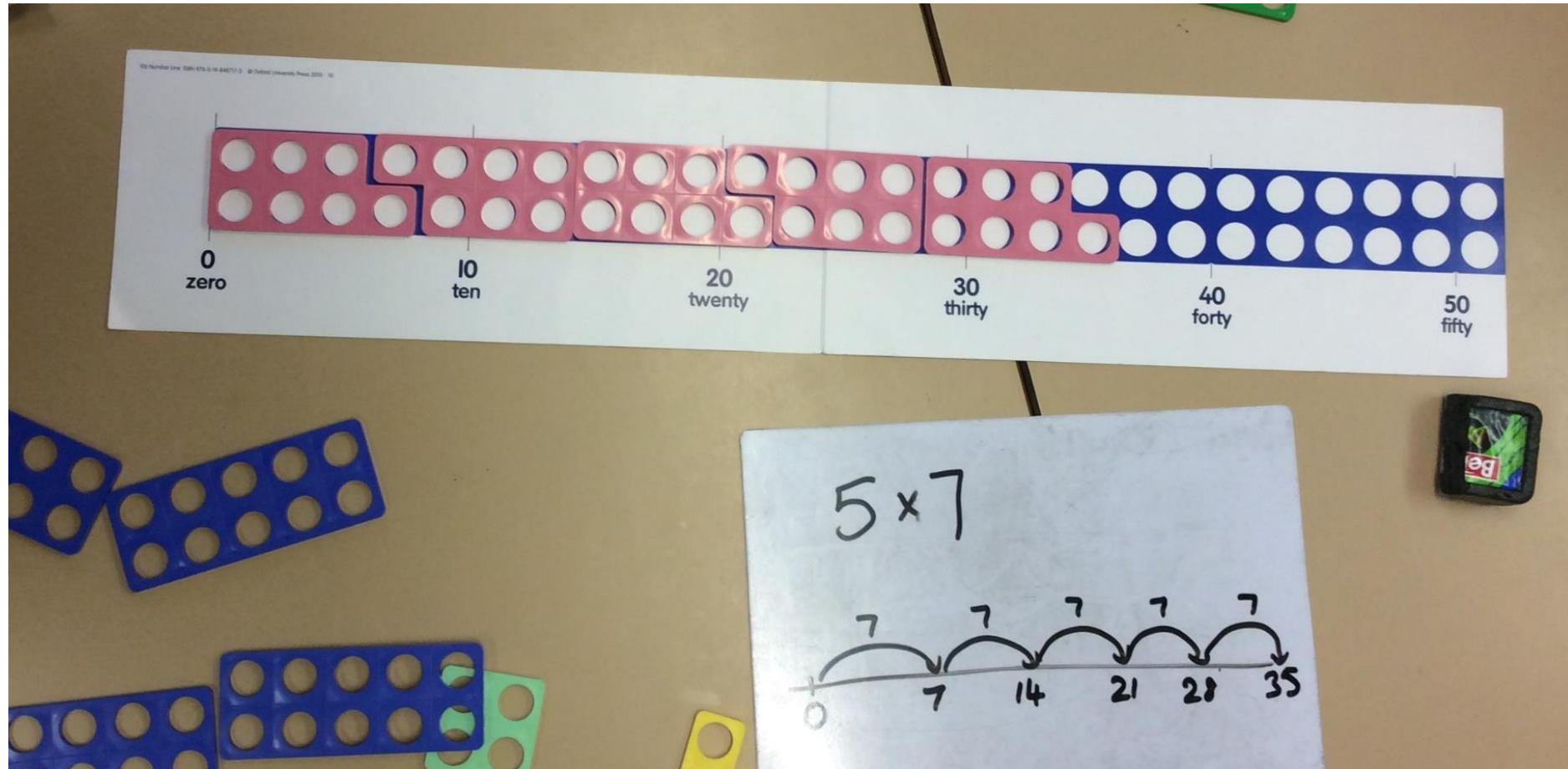
$\frac{3}{10} \times \frac{10}{3} = 10$
 $\frac{15}{3} = 5 \times 10 = 50$
 Ans = 50 ✓

How we teach multiplication.

Diennes for multiplication

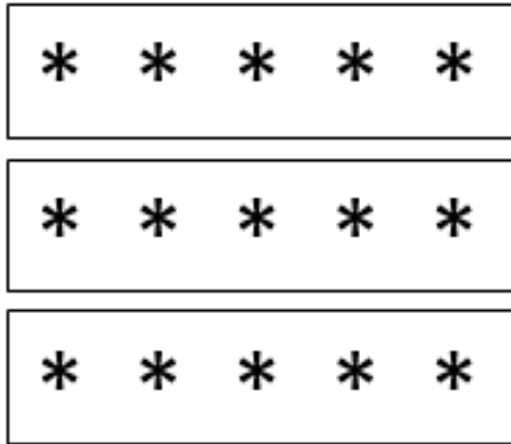


Numicon: multiplication

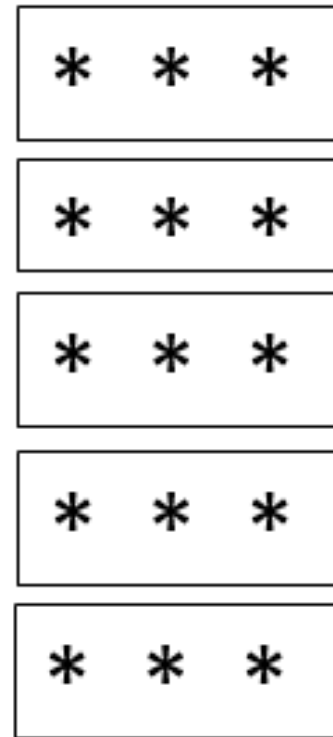


Arrays

3 groups of 5 (3×5)

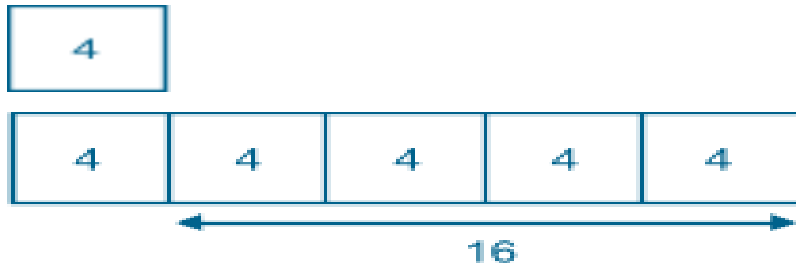


5 groups of 3 (5×3)



- Arranging numbers in this way allows children to develop an understanding of the commutative nature of multiplication eg the order of 3 and 5 does not change the answer.

Peter has four books. Harry has five times as many books as Peter. How many more books does Harry have?



"Tens and Units" x "Tens and Units"

PARTITION *both* the number into Tens and Units

$$23 \times 45 = \quad ?$$

$$(23 = 20 + 3 \qquad 45 = 40 + 5)$$

	20	3
40	800	120
5	100	15
	<hr/>	<hr/>
	900	135

$$\begin{array}{r} 900 \\ + \quad \underline{135} \\ \hline 1035 \end{array}$$

$$23 \times 45 = 1035$$

Jottings

$$\begin{array}{l} 4 \times \underline{2} = 8 \\ 40 \times \underline{2} = 80 \\ 40 \times 20 = 800 \end{array}$$

$$\begin{array}{l} \underline{4} \times 3 = 12 \\ 40 \times 3 = 120 \end{array}$$

$$\begin{array}{l} 5 \times 2 = 10 \\ 5 \times 20 = \underline{100} \end{array}$$

24 × 6 becomes

$$\begin{array}{r} 4 \\ \times 6 \\ \hline 144 \\ \hline 2 \end{array}$$

Answer: 144

342 × 7 becomes

$$\begin{array}{r} 4 2 \\ \times 7 \\ \hline 2394 \\ \hline 2 \end{array}$$

Answer: 2394

2741 × 6 becomes

$$\begin{array}{r} 7 4 1 \\ \times 6 \\ \hline 16446 \\ \hline 4 \end{array}$$

Answer: 16 446

National Curriculum, 2014.

<https://www.gov.uk/government/collections/national-curriculum>

24 × 16 becomes

$$\begin{array}{r} \\ \\ \times \\ \hline \\ \\ \hline \\ \hline \\ \hline \end{array}$$

Answer: 384

124 × 26 becomes

$$\begin{array}{r} \\ \\ \times \\ \hline \\ \\ \hline \\ \hline \\ \hline \end{array}$$

Answer: 3224

124 × 26 becomes

$$\begin{array}{r} \\ \\ \times \\ \hline \\ \\ \hline \\ \hline \\ \hline \end{array}$$

Answer: 3224

National Curriculum, 2014.

<https://www.gov.uk/government/collections/national-curriculum>

References:

Erie 2 Math, The Bar Model-Singapore Math Model Method, 2012. <http://e2math.weebly.com/models-to-support-thinking/bar-model-singapore-math-model-method>
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Southwell Schools' Shared Calculation Policy

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<https://www.gov.uk/government/collections/national-curriculum>