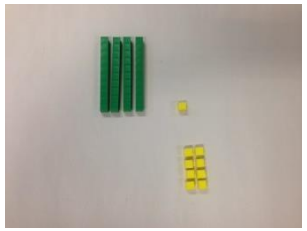
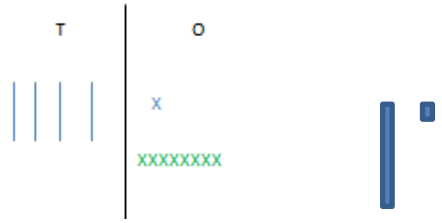
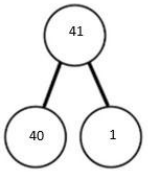
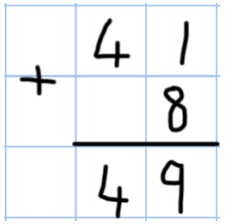
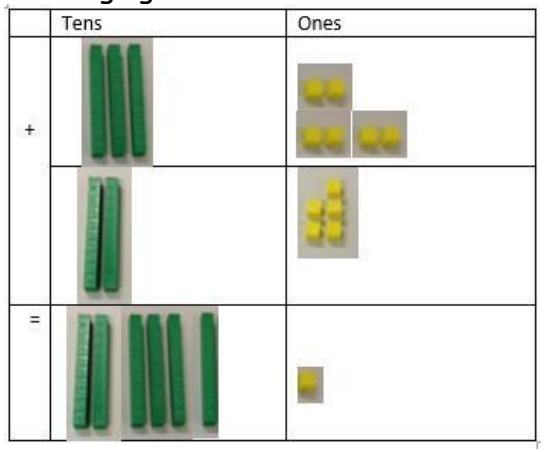
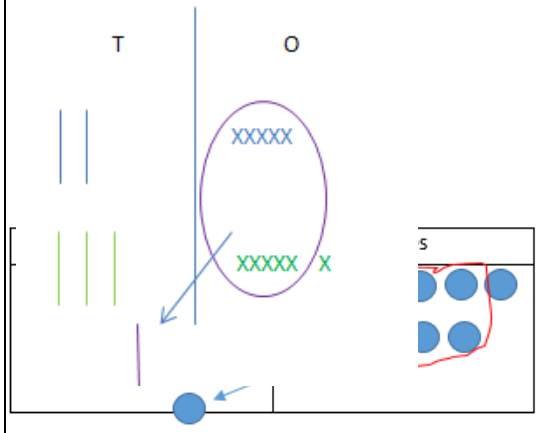
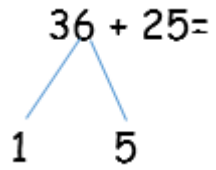
Year 3 Mathematics
How to support your child at home

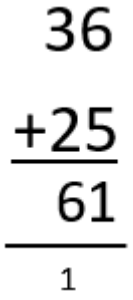
We have been really impressed by the number of parents who have been taking an interest in supporting their child with their mathematics learning at home. This year, we have changed the way we teach Mathematics to really focus on reasoning and problem solving. To teach mathematical fluency, we are now using a CPA (Concrete, Pictorial, Abstract) approach. This is shown in the calculation strategies outlined in this document. Understandably, it is really important the strategies used at home are the same as the strategies we are using in school.

Addition-

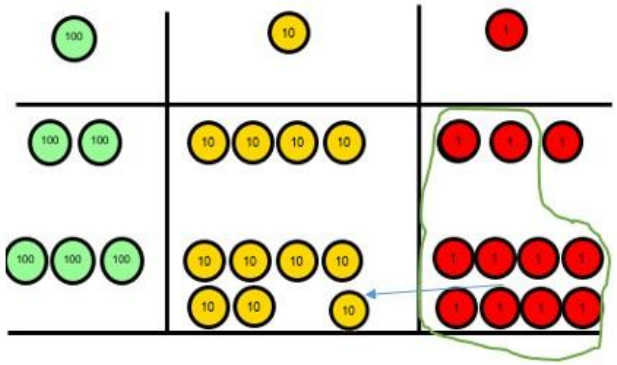
Key language which should be used: sum, total, parts and wholes, plus, add, altogether, more than, 'is equal to' 'is the same as'

<table>
<tr>
<td>TO + O using base 10. Continue to develop understanding of partitioning and place value
41 + 8
  </td>
<td>Children to represent the concrete using a particular symbol e.g. lines for tens and dot/crosses for ones.
 
</td>
<td>41 + 8
 

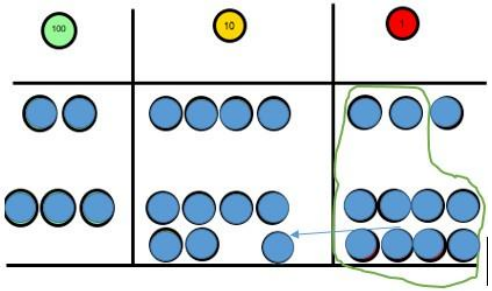
1 + 8 = 9
40 + 9 = 49
 
</td>
</tr>
<tr>
<td>TO + TO using base 10. Continue to develop understanding of partitioning and place value and use this to support addition. Begin with no exchanging. 36 + 25
 
</td>
<td>This could be done one of two ways:
 
</td>
<td>Looking for ways to make 10
 

30 + 20 = 50
5 + 5 = 10
50 + 10 + 1 = 61
Formal method:
 
</td>
</tr>
</table>

Use of place value counters to add HTO + TO, HTO + HTO etc. once the children have had practice with this, they should be able to apply it to larger numbers and the abstract



Chidren to represent the counters e.g. like the image below

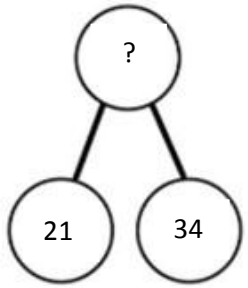


If the children are completing a word problem, draw a bar model to represent what it's asking them to do

?	
243	368

$$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline 1\ 1 \end{array}$$

Fluency variation, different ways to ask children to solve 21+34:



Sam saved £21 one week and £34 another. How much did he save in total?

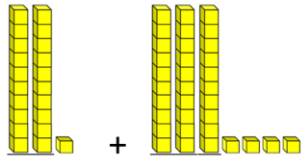
21+34=55. Prove it! (reasoning but the children need to be fluent in representing this)

$$\begin{array}{r} 21 \\ +34 \\ \hline \\ \hline \end{array}$$

21 + 34 =

$\square$ = 21 + 34

What's the sum of twenty one and thirty four?

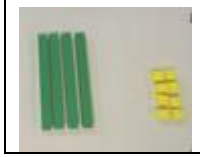
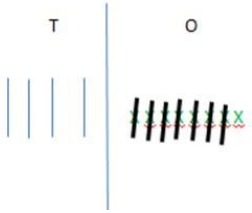
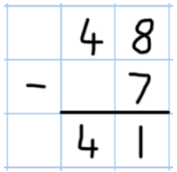


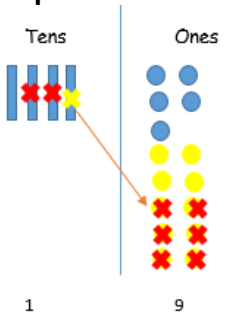
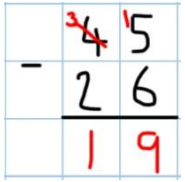
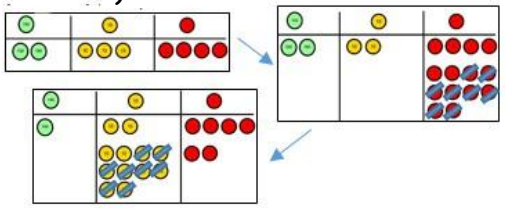
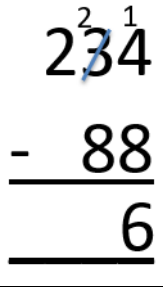
Always use missing digit problems too:

Tens	Ones
10 10	1
10 10 10	?
?	4

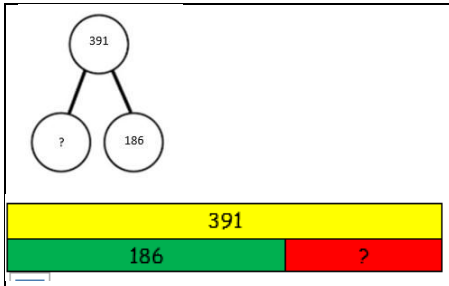
Subtraction-

Key language which should be used: take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Column method (using base 10) 48-7 		48 – 7 = 

Column method (using base 10 and having to exchange) **45-26**  1) Start by partitioning 45 2) Exchange one ten for ten more ones 3) Subtract the ones, then the tens.	**Represent the base 10 pictorially** 	It's crucial that the children understand that when they have exchanged the 10 they still have 45. 45 = 30 + 15 
Column method (using place value counters) 234-88 	Once the children have had practice with the concrete, they should be able to apply it to any subtraction. Like the other pictorial representations, children to represent the counters.	

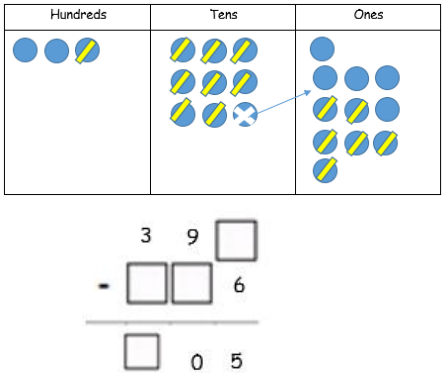
Fluency variation, different ways to ask children to solve 391-186:

<table>
<tr>
<td> 
</td>
<td>Raj spent £391, Timmy spent £186. How much more did Raj spend?

I had 391 metres to run. After 186 I stopped. How many metres do I have left to run?</td>
<td>391 – 186

= 391 – 186

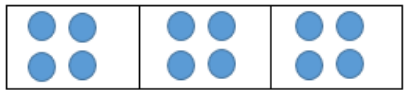
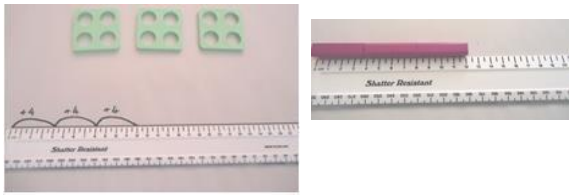
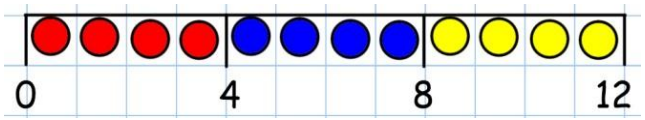
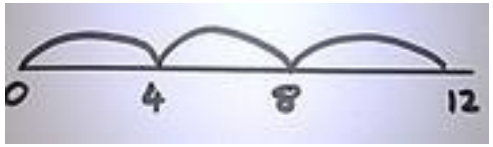
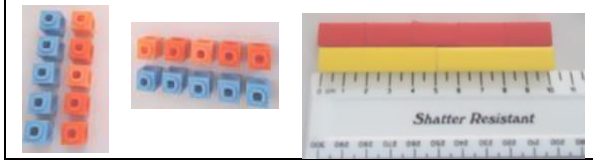
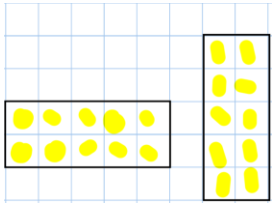
391
-186
____

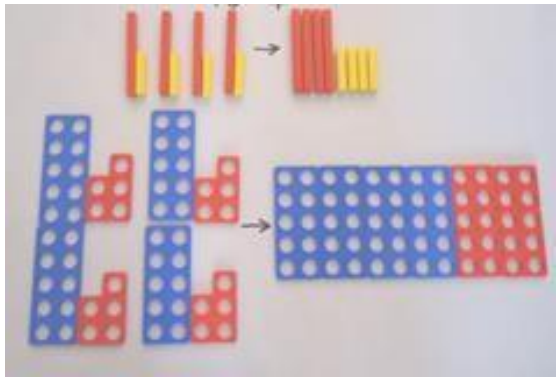
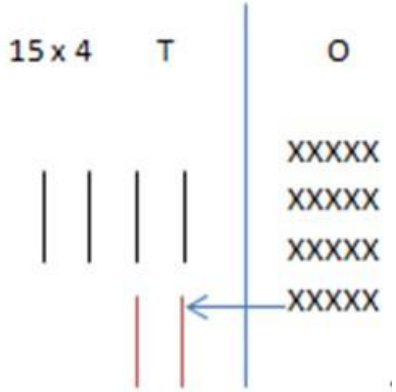
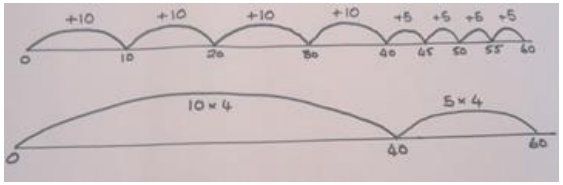
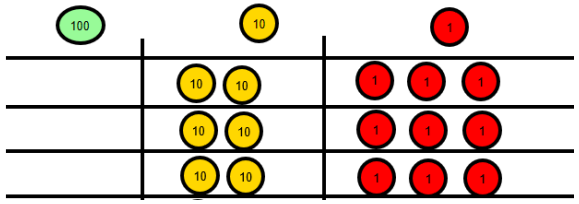
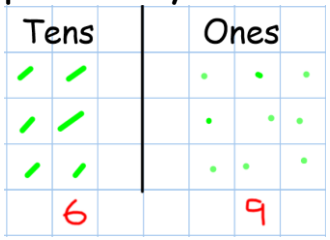
Find the difference ebtween 391 and 186
Subtract 186 from 391.
What is 186 less than 391?</td>
<td>What's the calculation? What's the answer?
 

</td>
</tr>
</table>

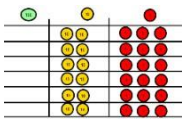
Multiplication-

Key language which should be used: double times, multiplied by, the product of, groups of, lots of, 'is equal to' 'is the same as'

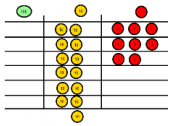
Concrete	Pictorial	Abstract
Repeated grouping/repeated addition (does not have to be restricted to cubes) 3 x 4 or 3 lots of 4 	Children to represent the practical resources in a picture e.g. XX XX XX XX XX XX Use of a bar model for a more structured method 	3 x 4 4 + 4 + 4
Use number lines to show repeated groups- 3 x 4 	Represent this pictorially alongside a number line e.g: 	Abstract number line **3 x 4 = 12** 
Use arrays to illustrate commutativity (counters and other objects can also be used) **2 x 5 = 5 x 2** 	Children to draw the arrays 	Children to be able to use an array to write a range of calculations e.g. 2 x 5 = 10 5 x 2 = 10 2 + 2 + 2 + 2 + 2 = 10 5 + 5 =10

Partition to multiply (use numicon, base 10, Cuisenaire rods) 4 x 15 	Children to represent the concrete manipulatives in a picture e.g. base 10 can be represented like:  	Children to be encouraged to show the steps they have taken 4 x 15 10 5 10 x 4 = 40 5 x 4 = 20 40 + 20 = 60 A number line can also be used 
Formal column method with place value counters or base 10 (at the first stage- no exchanging) 3 x 23 Make 23, 3 times. See how many ones, then how many tens  	**Children to represent the counters in a pictorial way**  	Children to record what it is they are doing to show understanding 3 x 23 20 3 3 x 20 = 60 3 x 3 = 9 60 + 9= 69 23 x 3 69
Formal column method with place value counters (children need this stage, initially, to understand how the column method works)	Children to represent the counters/base 10, pictorially e.g. the image below.	**6 x 23** 6 x 3 = 18 6 x 20 = 120 120 + 18 = 138

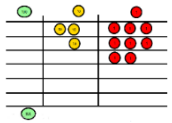
6 x 23



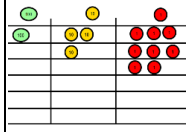
Step 1: get 6 lots of 23



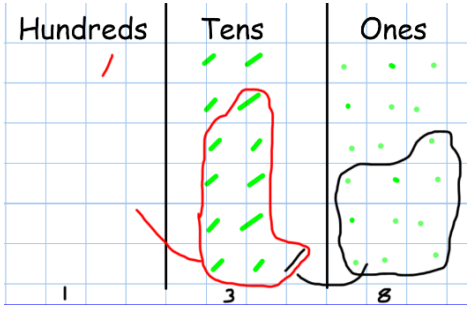
Step 2: 6 x 3 is 18. Can I make an exchange? Yes! Ten ones for one ten….



Step 3: 6 x 2 tens and my extra ten is 13 tens. Can I make an exchange? Yes! Ten tens for one hundred…



Step 4- what do I have I each column?

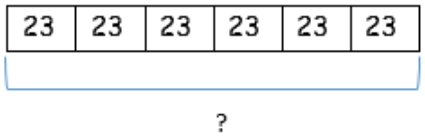


The aim is to get to the formal method but the children need to understand how it works.

6 x 23 =

$$\begin{array}{r} 23 \\ \times\ 6 \\ \hline 138 \\ \hline 1\ 1 \end{array}$$

Fluency variation, different ways to ask children to solve 6 x 23:



With the counters, prove that 6 x 23 = 138

Why is 6 x 23 = 32 x 6?

Mai had to swim 23 lengths, 6 times a week. How many lengths did she swim in one week?

Tom saved 23p three days a week. How much did he save in 2 weeks?

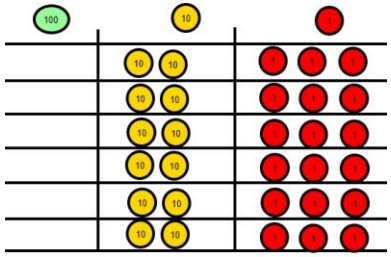
Find the product of 6 and 23

6 x 23 =

= 6 x 23

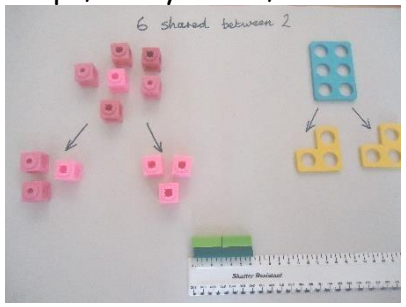
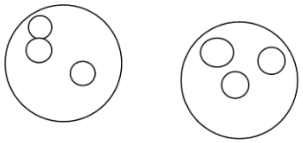
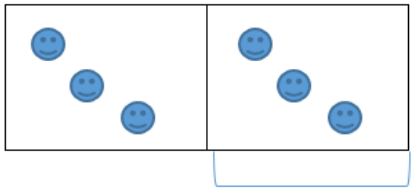
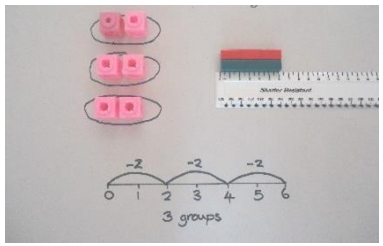
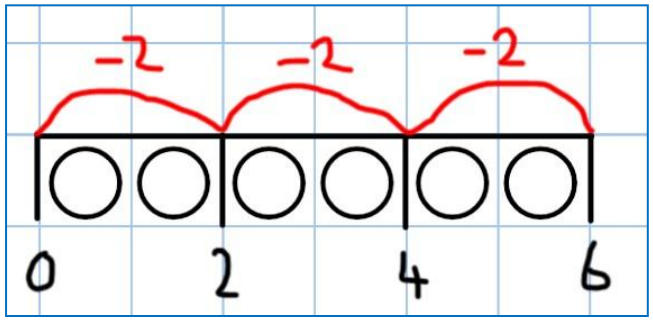
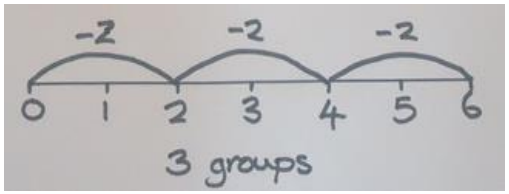
$$\begin{array}{r} 6 \\ \times\ 23 \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 23 \\ \times\ 6 \\ \hline \\ \hline \end{array}$$

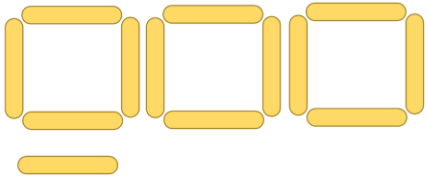
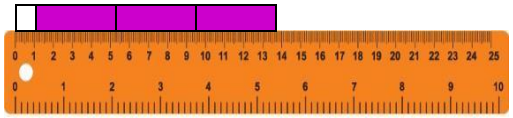
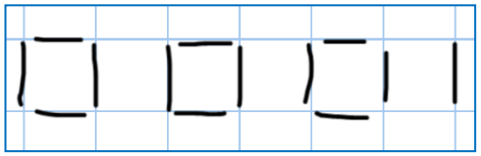
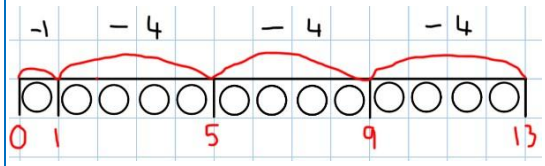
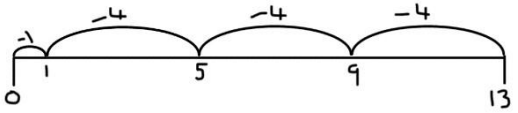
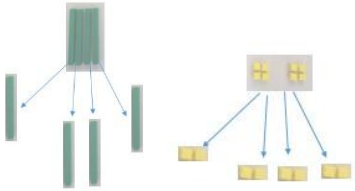
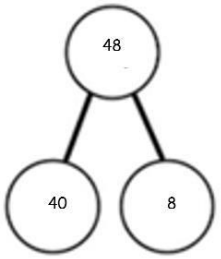
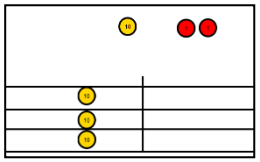
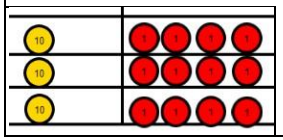
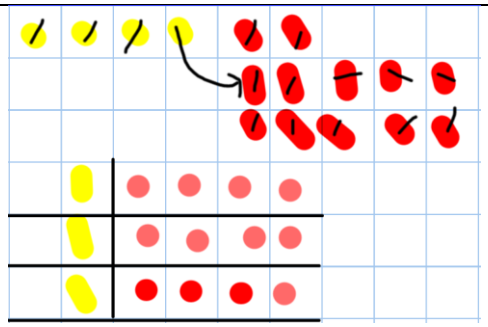
What's the calculation? What's the answer?



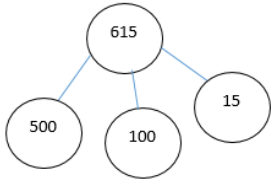
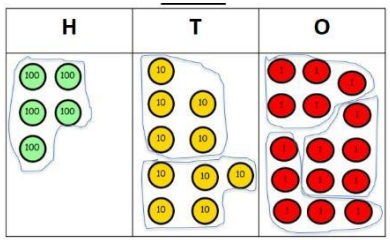
Division-

Key language which should be used: share, group, divide, divided by, half, 'is equal to' 'is the same as'

Concrete	Pictorial	Abstract
6 shared between 2 (other concrete objects can also be used e.g. children and hoops, teddy bears, cakes and plates) 	 This can also be done in a bar so all 4 operations have a similar structure: 	6 ÷ 2 = 3 What's the calculation? 3 | 3
Understand division as repeated grouping and subtracting 6 ÷ 2 		Abstract number line 
2d ÷ 1d with remainders 13 ÷ 4 – 3 remainder 1	Children to have chance to represent the resources they use in a pictorial way e.g. see below:	13 ÷ 4 – 3 remainder 1 Children to count their times tables facts in their heads

Use of lollipop sticks to form wholes  Use of Cuisenaire rods and rulers (using repeated subtraction) 	 	
2d divided by 1d using base 10 (no remainders) SHARING **48 ÷ 4 = 12**  Start with the tens.	Children to represent the base 10 and sharing pictorially.	48 ÷ 4 4 tens ÷ 4 = 1 ten 8 ones ÷ 4 = 2 ones  10 + 2 = 12
Sharing using place value counters. 42 ÷ 3= 14  1. Make 42. Share the 4 tens between 3. Can we make an exchange with the extra 10?  Exchange the ten for 10 ones and share out 12 ones		42 ÷ 3 42 = 30 + 12 30 ÷ 3 = 10 12 ÷ 3 = 4 10 + 4 = 14

Fluency variation, different ways to ask children to solve 615 ÷ 5:

Using the part whole model below, how can you divide 615 by 5 without using the 'bus stop' method?  	I have £615 and share it equally between 5 bank accounts. How much will be in each account? 615 pupils need to be put into 5 groups. How many will be in each group?	$5\overline{)615}$ 615 ÷ 5 = = 615 ÷ 5 How many 5's go into 615?	What's the calculation? What's the answer? _____ 

Year 3 Age-Related Expectations

Number and Place Value

- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- recognise the place value of each digit in a 3-digit number (100s, 10s, 1s)
- compare and order numbers up to 1,000
- identify, represent and estimate numbers using different representations
- read and write numbers up to 1,000 in numerals and in words
- solve number problems and practical problems involving these ideas

Addition and Subtraction

- add and subtract numbers mentally, including:
- a three-digit number and 1s
- a three-digit number and 10s
- a three-digit number and 100s
- add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Multiplication and Division

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

Fractions

- count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators

- recognise and show, using diagrams, equivalent fractions with small denominators
- add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$]
- compare and order unit fractions, and fractions with the same denominators
- solve problems that involve all of the above

Measurement

- measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
- measure the perimeter of simple 2-D shapes
- add and subtract amounts of money to give change, using both £ and p in practical contexts
- tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
- estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight
- know the number of seconds in a minute and the number of days in each month, year and leap year
- compare durations of events [for example, to calculate the time taken by particular events or tasks]

Geometry – Properties of Shapes

- draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them
- recognise angles as a property of shape or a description of a turn
- identify right angles, recognise that 2 right angles make a half-turn, 3 make three-quarters of a turn and 4 a complete turn; identify whether angles are greater than or less than a right angle
- identify horizontal and vertical lines and pairs of perpendicular and parallel lines

Statistics

- interpret and present data using bar charts, pictograms and tables
- solve one-step and two-step questions [for example 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables