Good evening!

Thank you for coming.

This evening we will provide you with information on how we teach Mathematics at Moorlands and suggest ways that you can help your child at home using similar methods. Whilst you are waiting, please feel free to look at the resources on the table at the front.

Maths at Moorlands.
A focus on Concrete, Pictorial and Abstract approaches. (CPA)

Karen Chapman and Justine Jackson

Maths Leaders Moorlands Primary School

Why are we engaging parents?

BBC News Report 2006

69% of parents do not help children with their homework because…

*Everything has changed since they were at school and they are not **confident** in the new methods.*

MATHSHUBS
YORKSHIRE AND THE HUMBER

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Parent confidence and support

Lots of initiatives have been introduced, like ‘Keeping up with the Children,’ ‘Inspire Workshops’ and employing parental engagement coordinators in some schools.

Despite this, the situation worsened:

BBC News Report 2010

82% of parents feel unable to help pupils with their homework.

Lack of confidence?

The ‘problem’ with maths

MATHS HUBS
YORKSHIRE AND THE HUMBER

“My dad thinks that the way **he** does maths is easier and better than **my** way, but he doesn’t understand my way and his way confuses me.”

Pupil – Catford High School

In the Impact in Learning maths programme, children regularly talked about the **clash** between the maths learnt in school and what parents were showing them at home.

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Why it is important to engage parents with the mathematical learning of their children?

Research evidence suggests that when parents are engaged in their children's learning, outcomes for children can be improved.

Research also highlights the fact that parents feel they need more support to understand the current curriculum content and how they can support their child with their learning at home.

Desforges, C. and Abouchaar, A. (2003); Goodall, J. and Vorhaus, J. (2011); The Education Endowment Foundation (2019); Sarjeant, S. (2021)

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Agenda

- *The theory behind the importance of CPA – Concrete Pictorial Abstract*

- *Using manipulatives to introduce the basics of a new concept and ways to replicate this at home.*

- *Transitioning between concrete, pictorial and abstract.*

Concrete, Pictorial and Abstract Methods

Importance of CPA

In his research on the cognitive development of children (1966), Jerome Bruner proposed three ways of working to aid development:

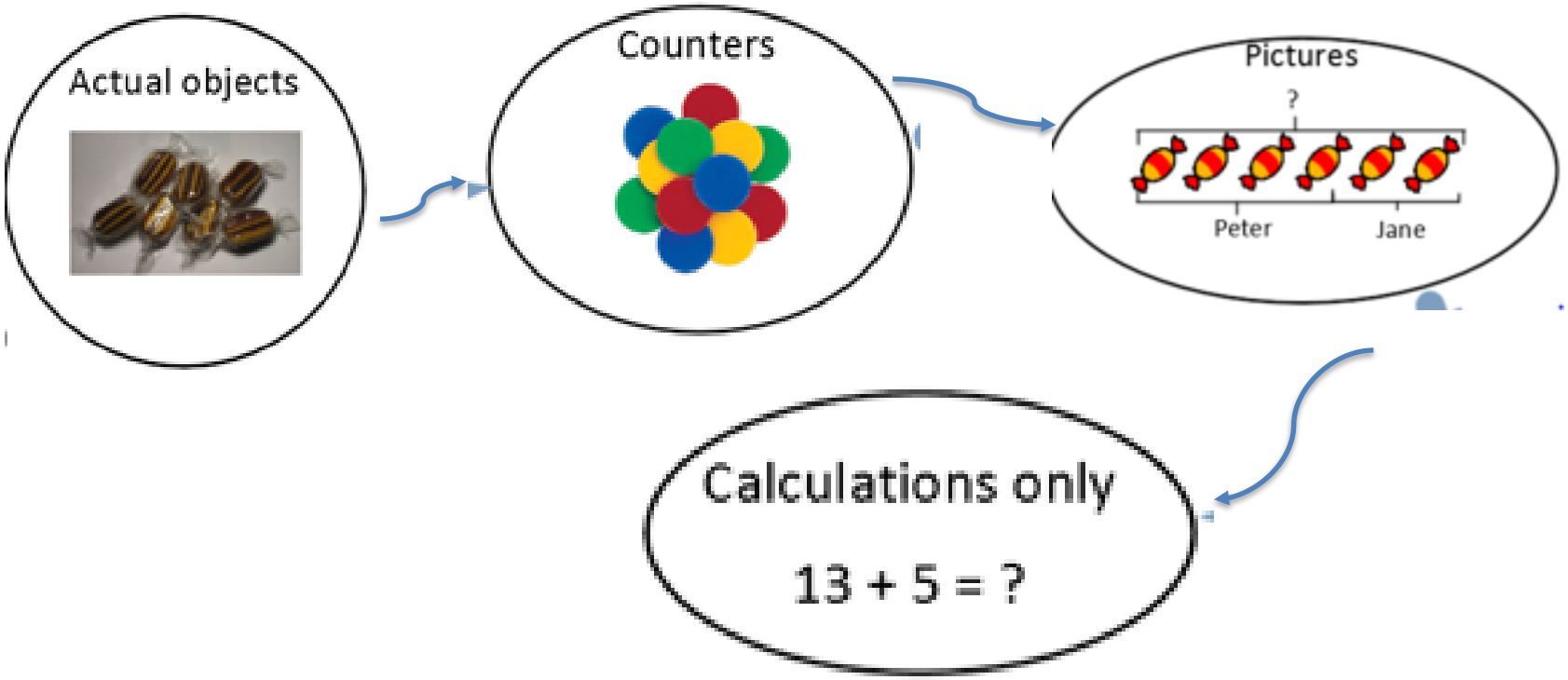
- Enactive representation (using 'concrete' objects)
- Iconic representation (drawing images / pictures)
- Symbolic representation (abstract numbers)

"If we do not use concrete manipulations, then we can not understand mathematics. If we only use concrete manipulations, then we are not doing mathematics."

Gu (2015)

Concrete, Pictorial, Abstract

Children should work at the stage they need until ready to move on. Within a class children can be working on the same calculation but accessing it in different ways.



Using CPA methods

Today we aim to give you a quick insight into methods used at school and how you could adapt those to work at home, with a focus on:

- *Place value*
- *Addition and Subtraction*
- *Multiplication and Division*
- *Fractions and Problem Solving*
- *Subitising*

Place Value

(understanding the value of each digit and it's place in the number system)

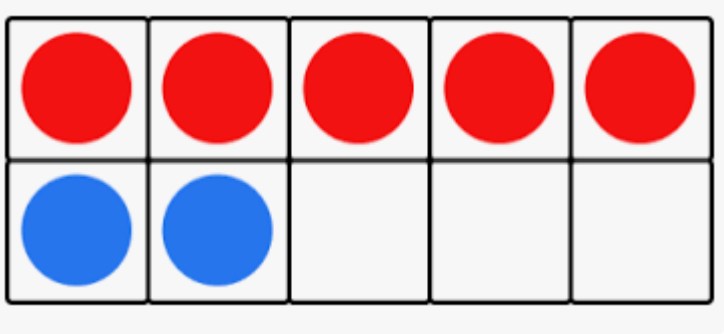
14 41

Place Value in the Early Years

Links with number sense and number bonds.

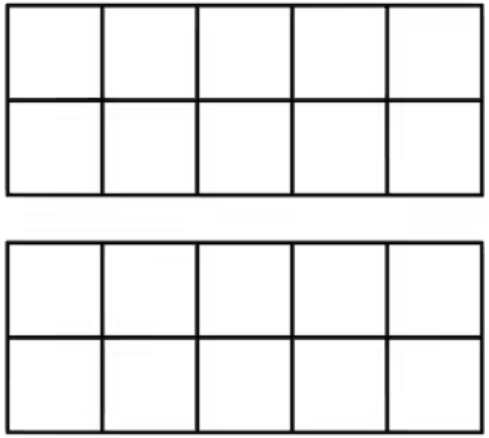
We complete a lot of work on quantity within quantity.

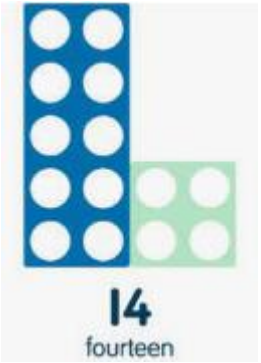
7



‘5 and some more’
How many more?

Teen Numbers:
10 and some more

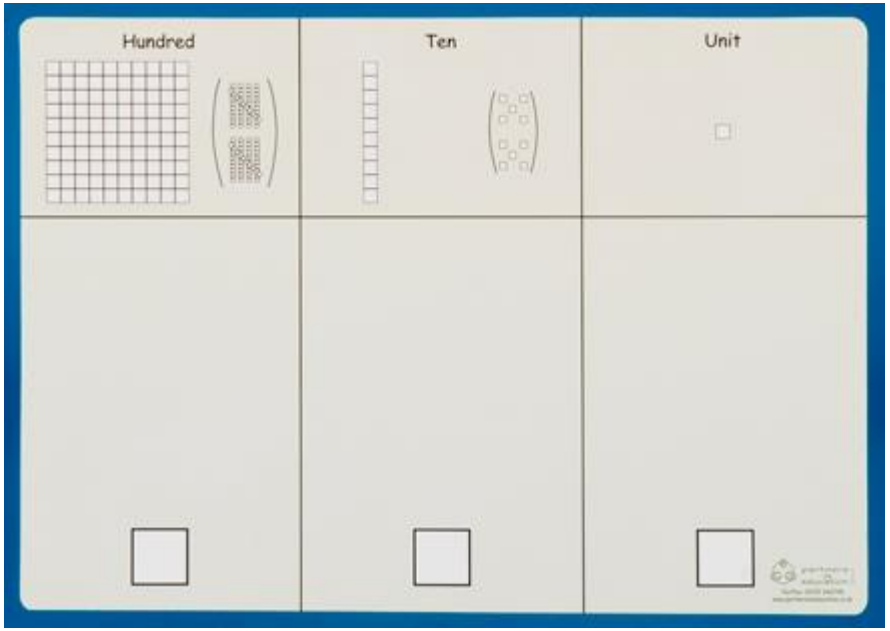




Place Value in the KS1

Looking at what each digit represents

Tens	Ones

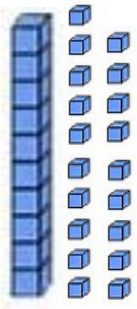


We use place value mats and concrete resources

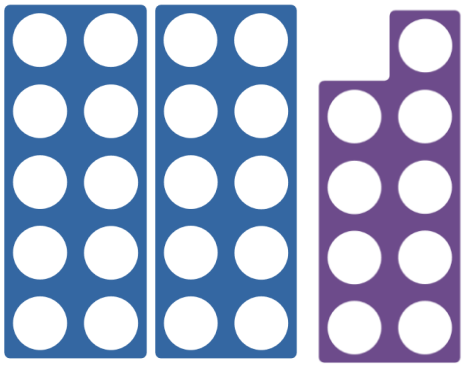
Place Value in KS1

How many ways can you show 29?

Twenty nine

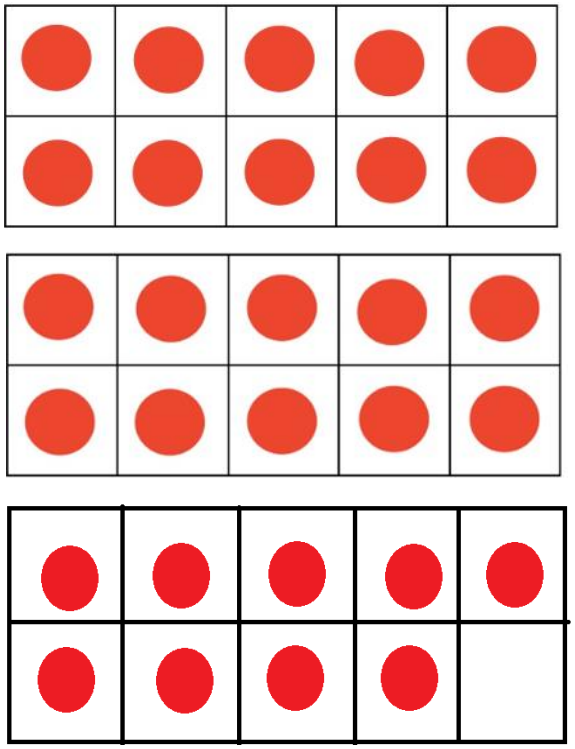


20 + 9

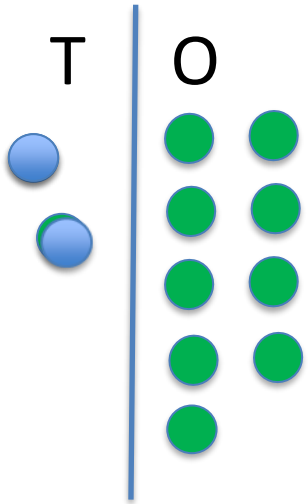


29

10 + 19



KS2

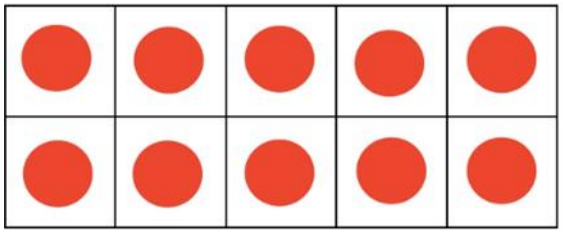


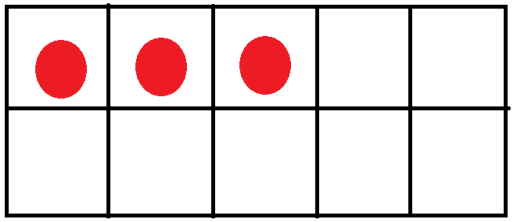
10 + 10 + 9

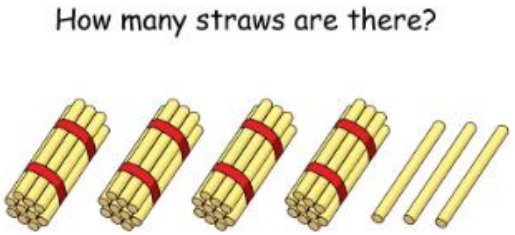
Introducing Tens and Ones

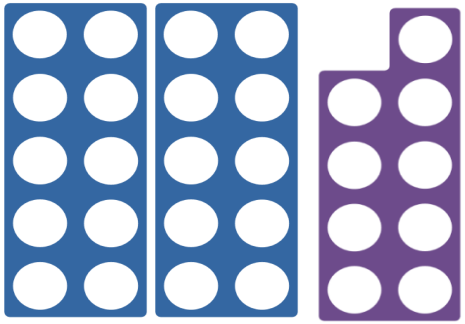
Count straws up to ten. (Rec/Year 1)

When we reach ten we can put these together to make 1 ten. Show me 15, 24, 32 etc. We use ten frames a lot. Children learn that when a frame is full it is worth 10. No need to count.









This then Moves on to Base 10

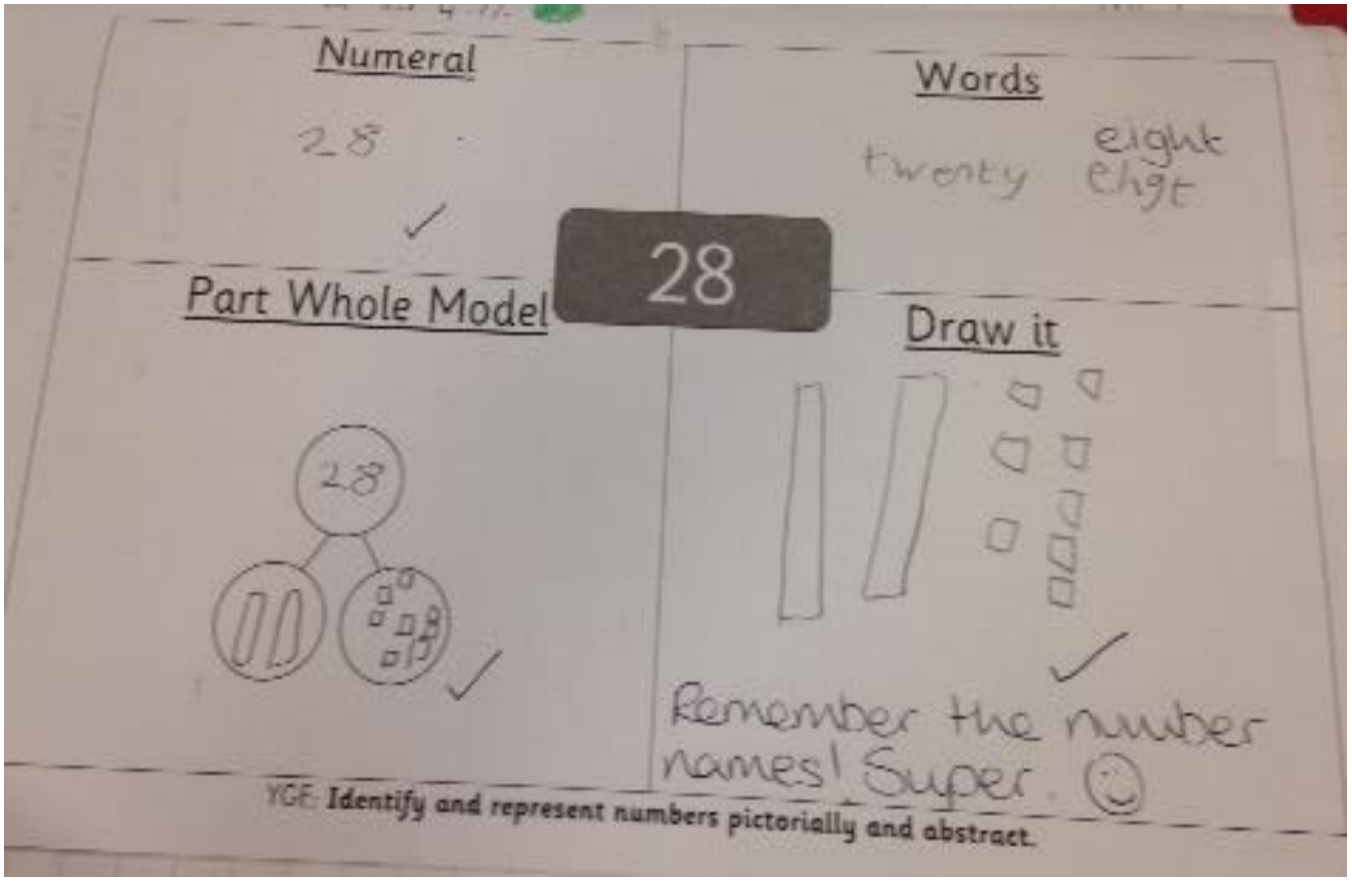
(summer Y1, Y2 Y3)

Tens and Ones at Home

- Make up your own systems
- Tens = sticks, ones = stones
- Tens = 1 straw, ones = chopped pieces of straw
- Make own version of Base 10 using cut up strips of paper.

At this stage it is really important that the children can see the 1s within the 10 or the 100.

Moving to Pictorial

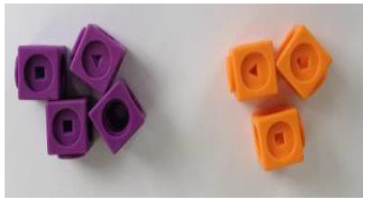


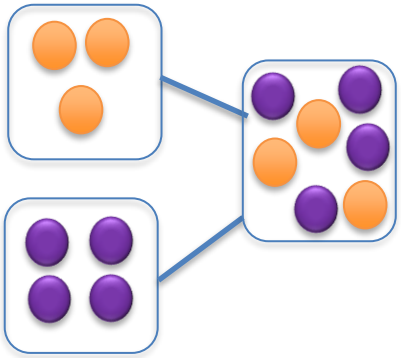
Addition

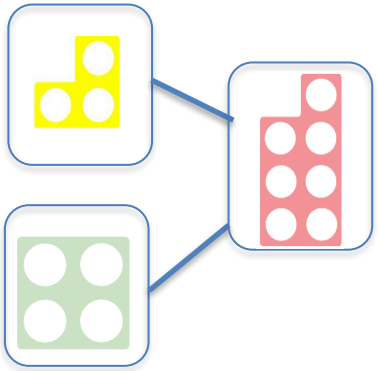
Addition: Part-Whole Model

Solve… 4 + 3 =

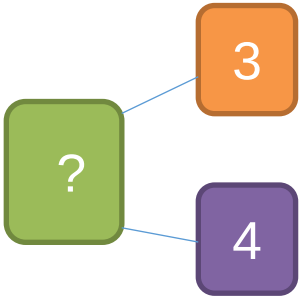
Model







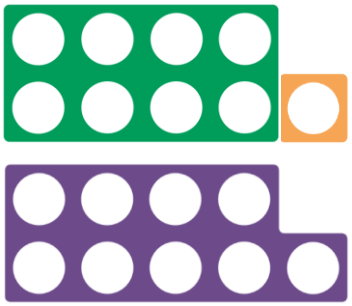
Calculations



Addition

Solve… 8 + 1 =

Model



Calculations

8 + 1 = 9

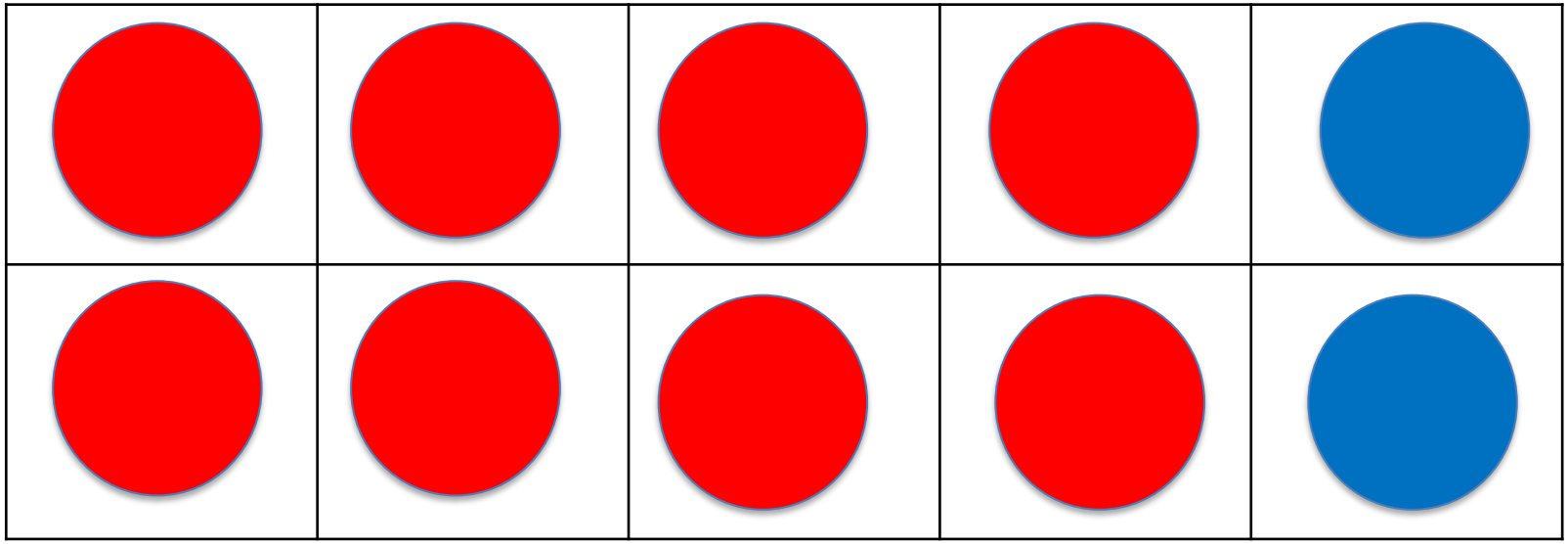
1 + 8 = 9

8 + ▢ = 9

▢ + 1 = 9

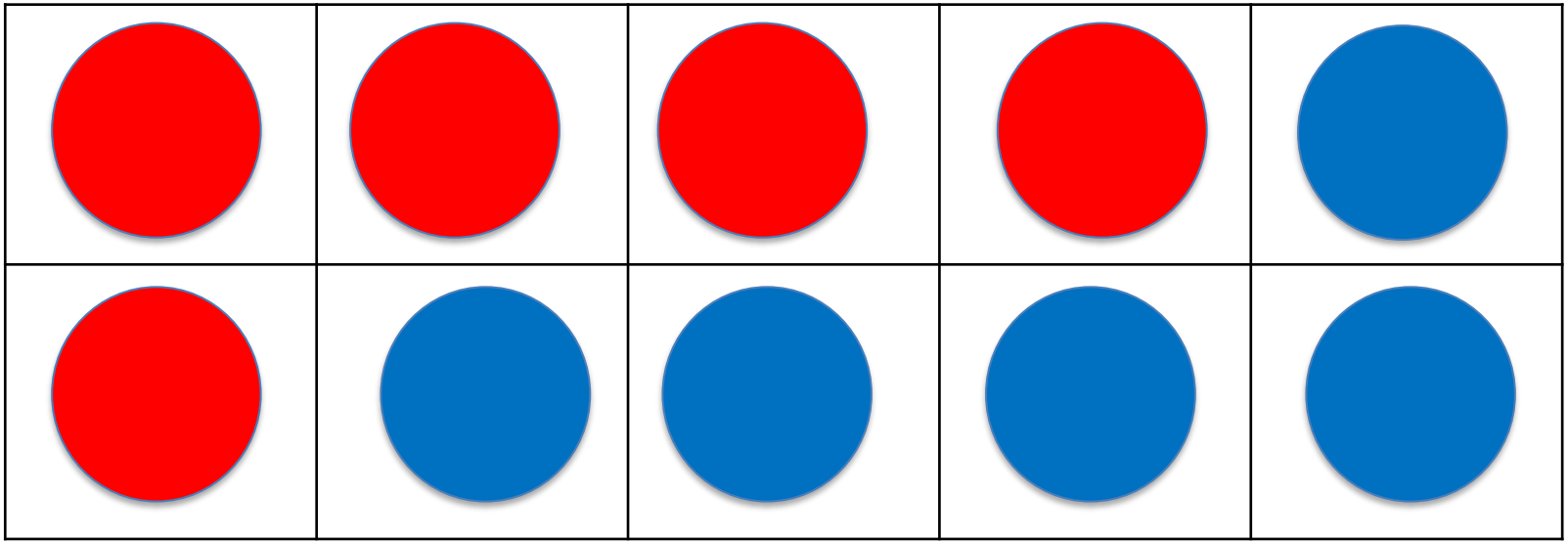
Number Bonds

Ten frames: Making 10 in different ways



Number bonds

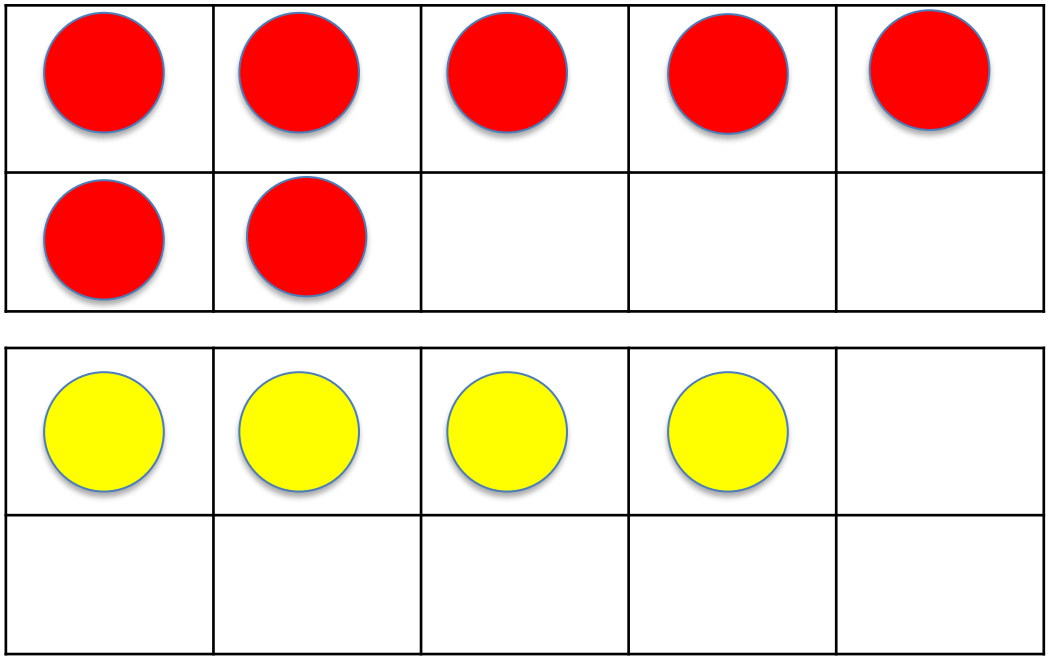
Ten frames: Making 10 in different ways



Addition: Regrouping to make 10

Solve… 7 + 4

Model

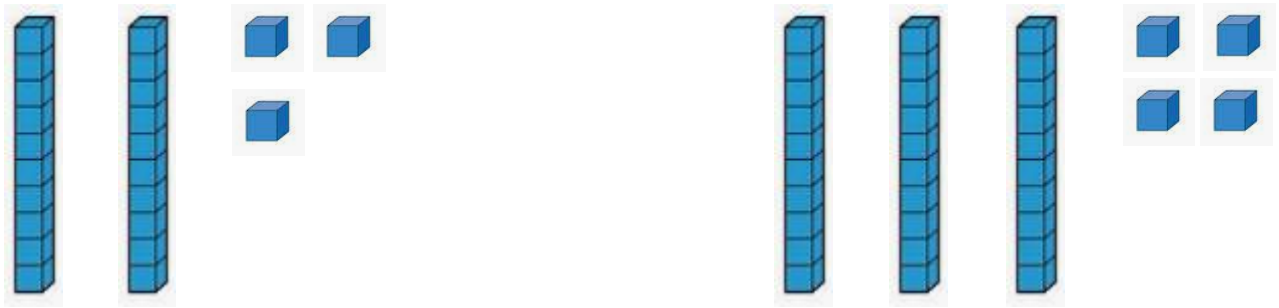


Calculations

7 + 4 = 11

Year 2 will move towards adding two, 2 digit numbers. We do not use the formal column method until Year 3. It is important that children can partition and add simple numbers together to make the process of column work easier once in KS2.

23 + 34 =



- Pupils are encouraged to draw sticks and spots in books to represent 10s and 1s

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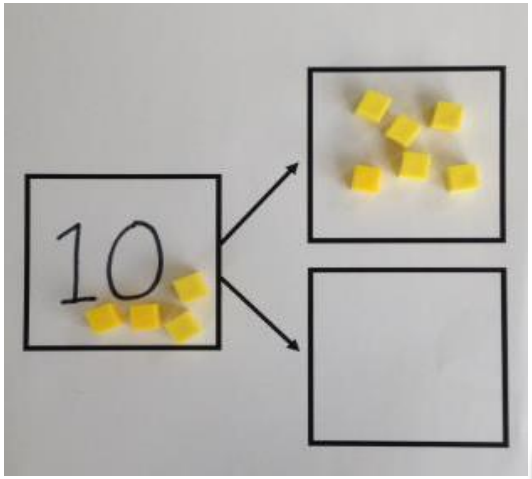
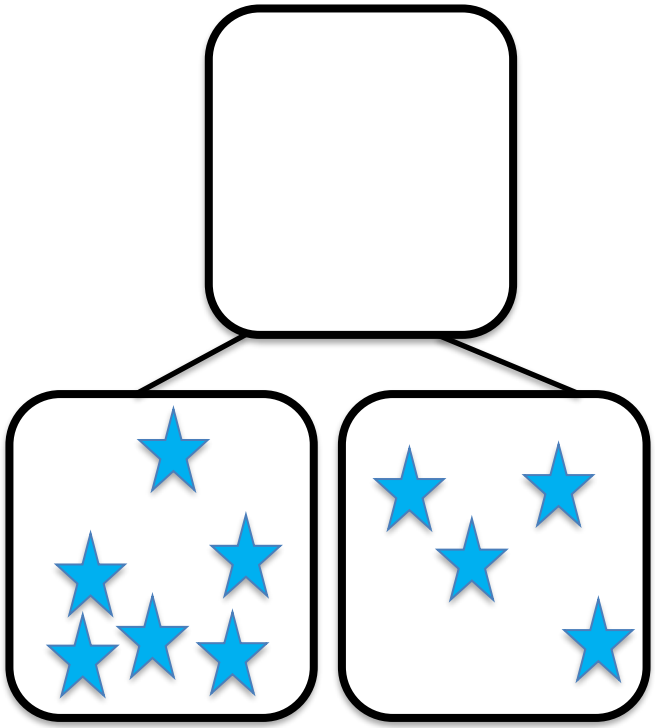
Subtraction

Subtraction- Part whole model

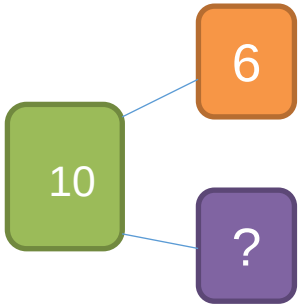
Solve… 10 – 6 =

Model





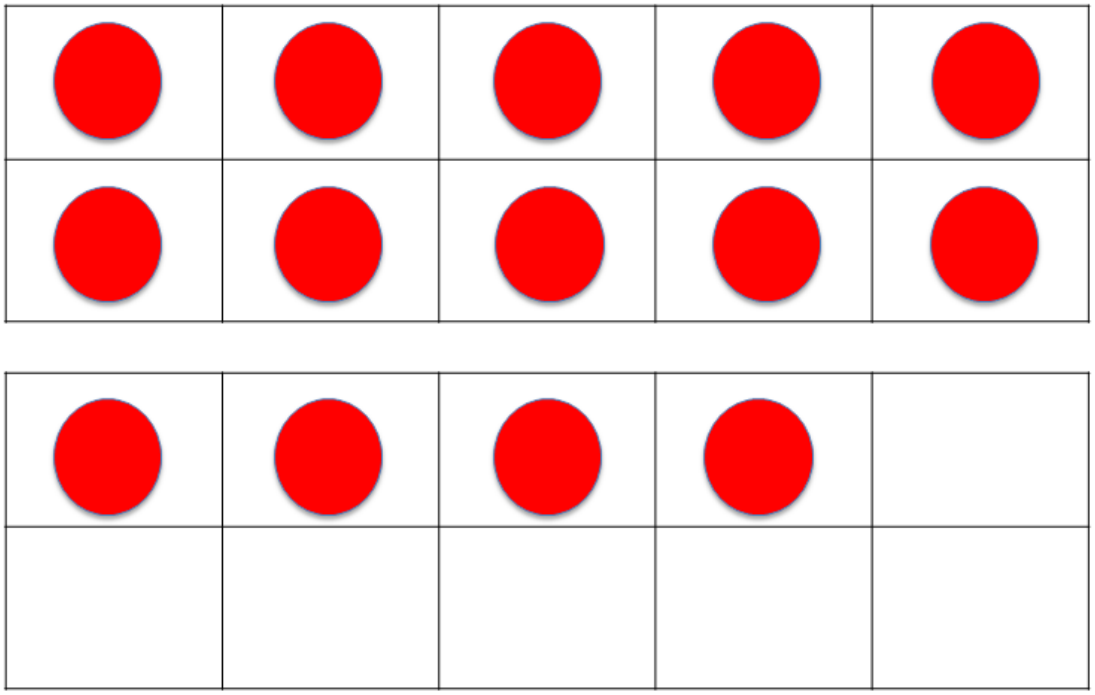
Calculations



Subtraction: Make 10

Solve… 14 – 5 =

Model



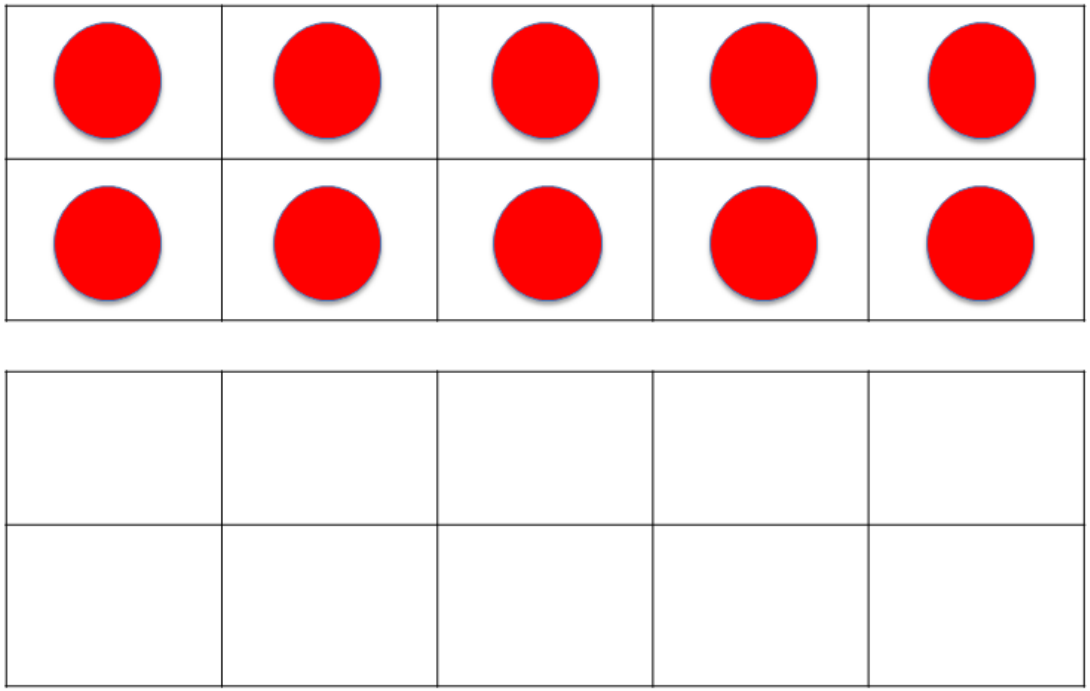
Calculations

14 – 5 =

Subtraction: Make 10

Solve… 14 – 5 =

Model



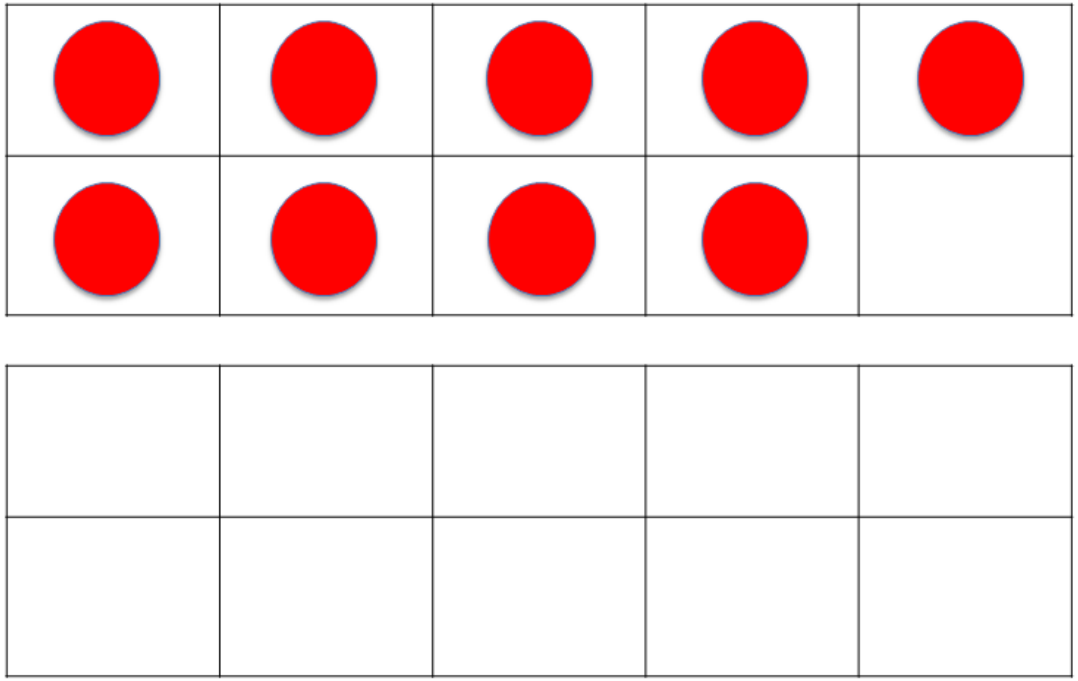
Calculations

14 – 5 =

Subtraction - Make 10

Solve… 14 – 5 =

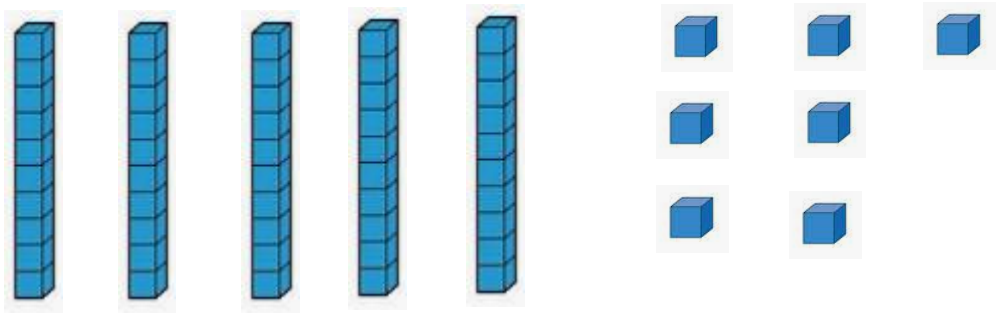
Model



Calculations

14 – 5 = 9

57 - 24 =



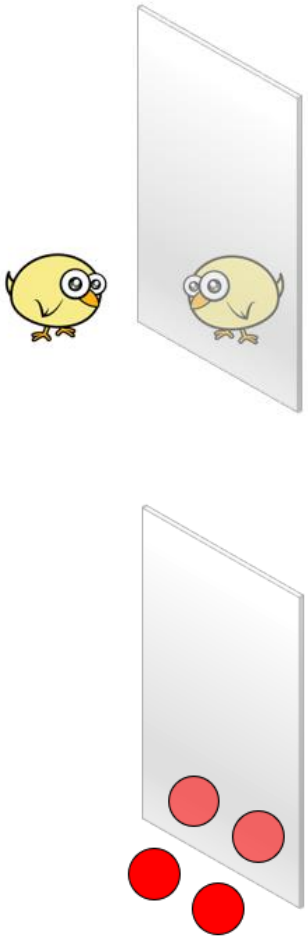
Pupils are encouraged to draw sticks and spots in books to represent 10s and 1s

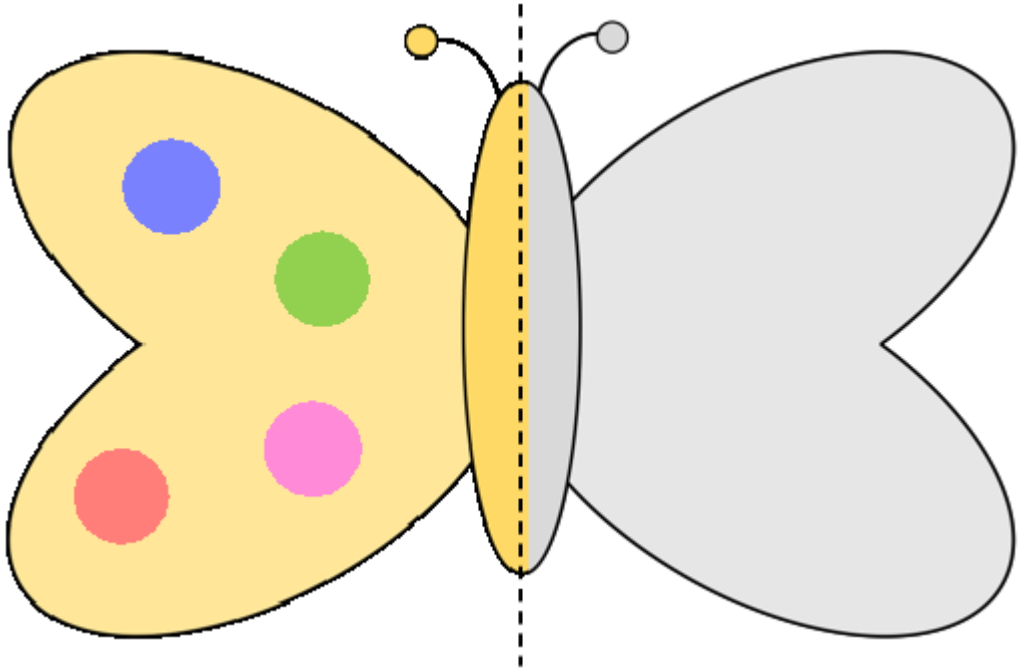
Moorlands Primary School

Multiplication

Multiplication in Reception

Double





Year 1

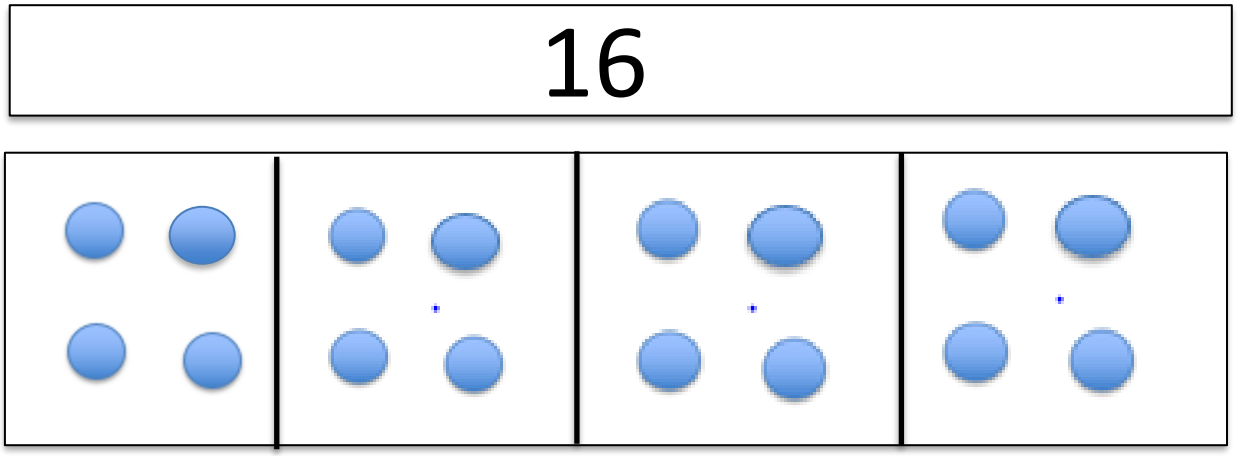
- *solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.*

Counting in 2s, 5s and 10s

Multiplication Using Concrete

3 + 3 + 3 + 3 + 3

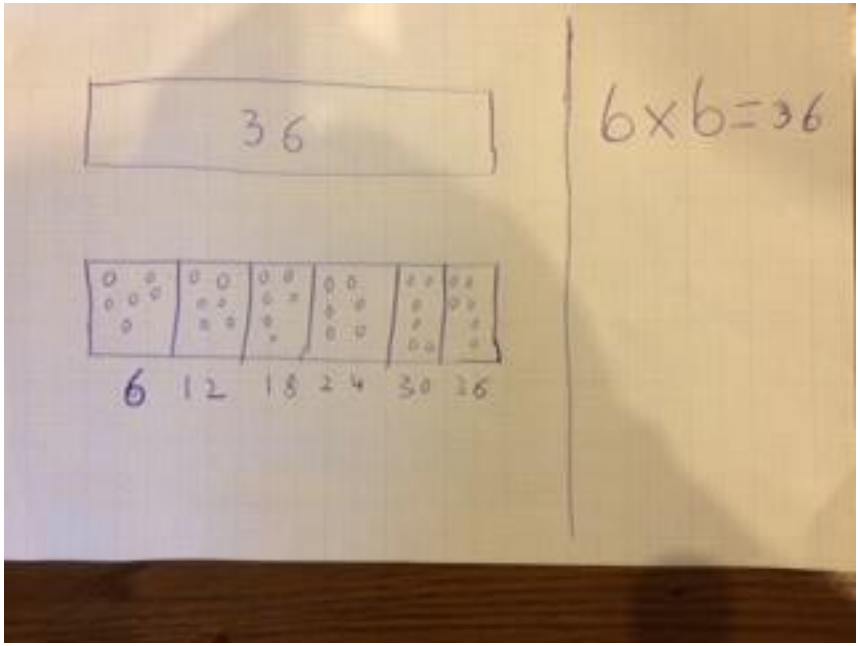
5 x 3



4 x 4 =

Pictorial with Place Value Counters

Children very quickly move on to using pictures to represent the objects and this can easily be done at home too.

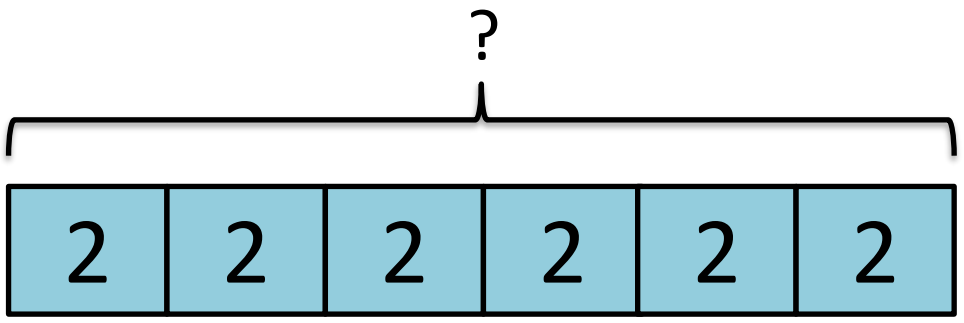


Multiplication

Muffins come in boxes of 2. Peter buys 6 boxes of muffins.

How many muffins does Peter buy all altogether?

Model



Calculations

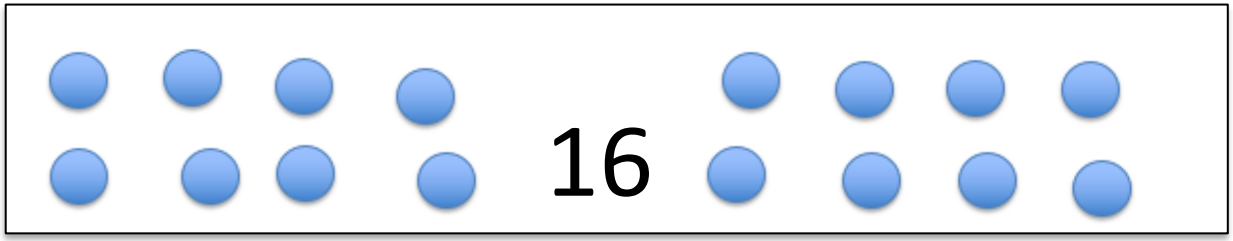
6 x 2 = 12

Year 2

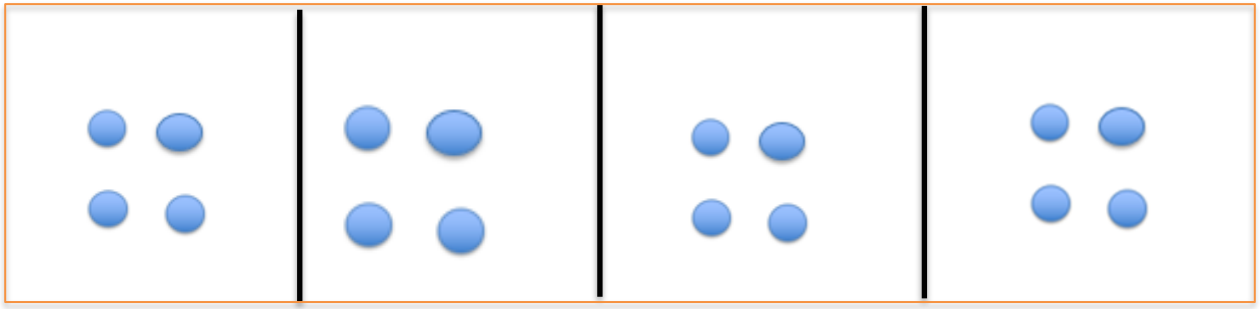
- *recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables*
- *solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.*

Division

Division Using Concrete



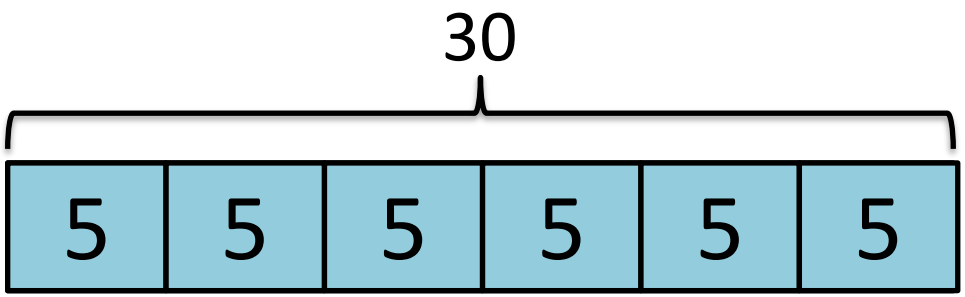
$16 \div 4 =$



Division (grouping)

Jane has 30 cakes. She wants to pack them into boxes with 5 cakes in each box. How many boxes will she need?

Model



Number of boxes needed = ?

Calculations

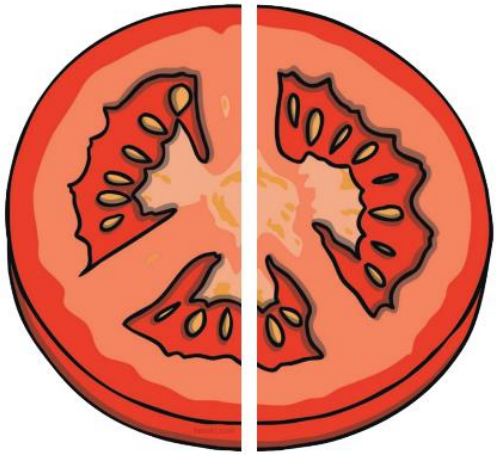
$30 \div 5 = 6$

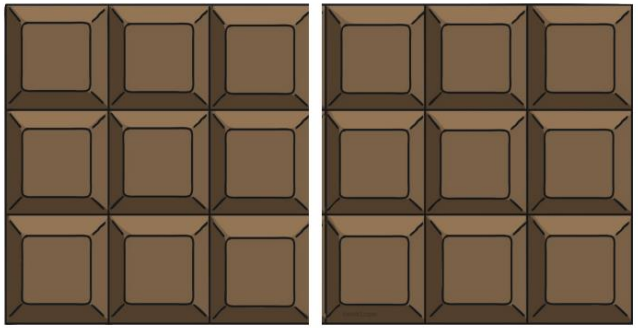
In this version, we are counting how many fives go into thirty.

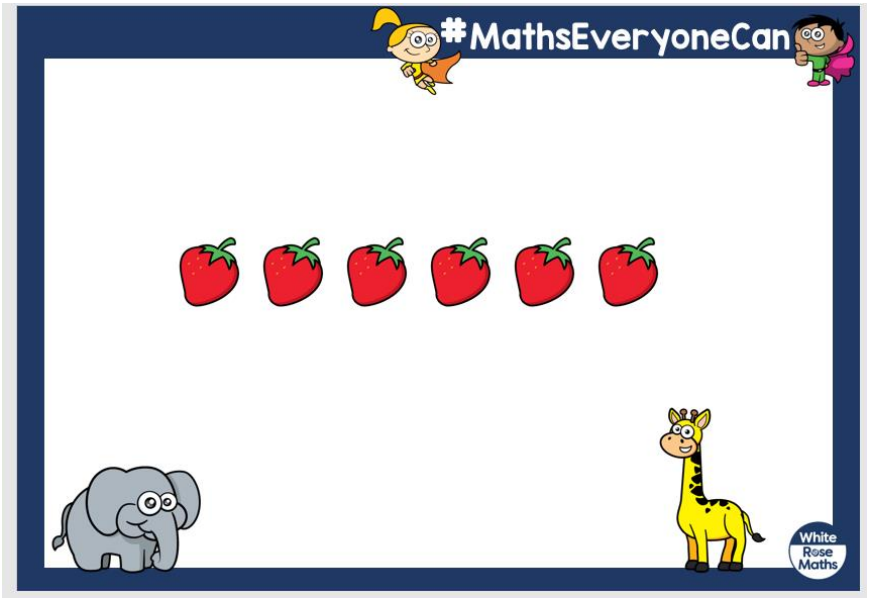
Fractions

Division/Fractions in Reception

Sharing

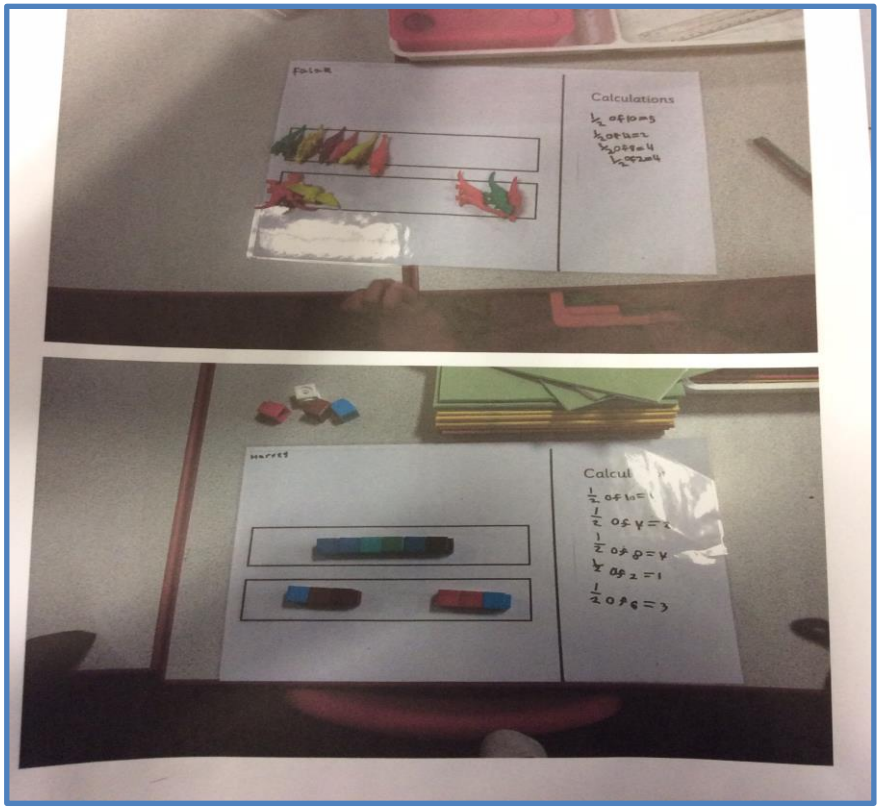


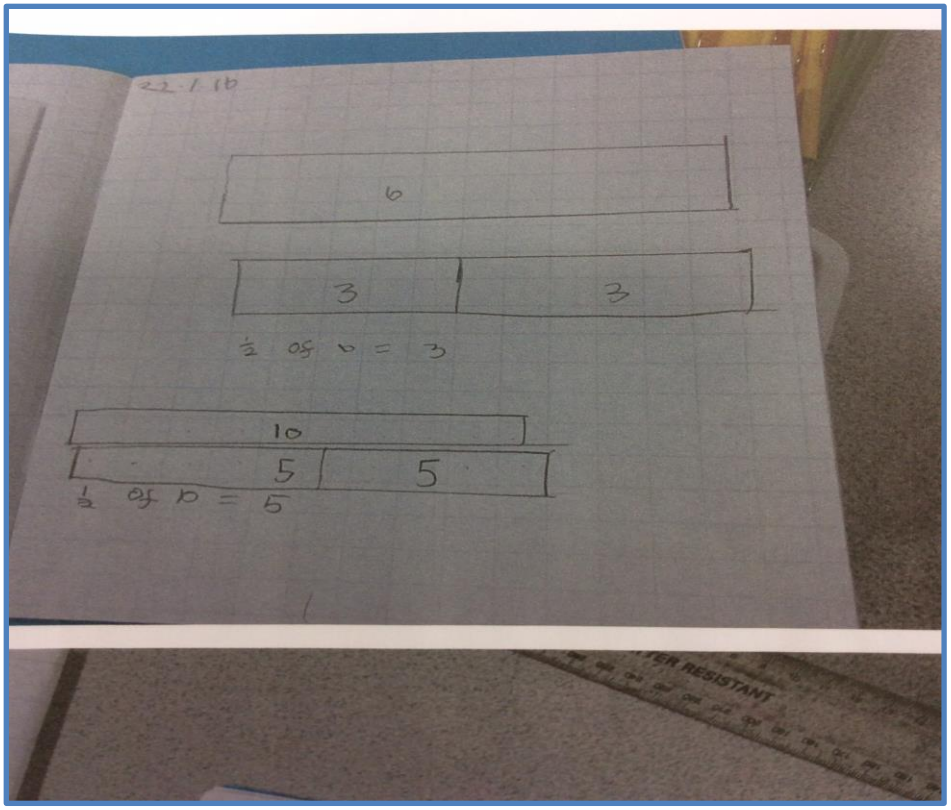




Children's Example

Year 1

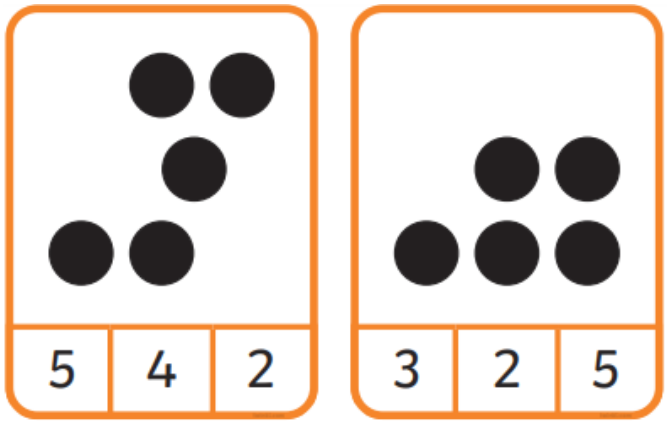




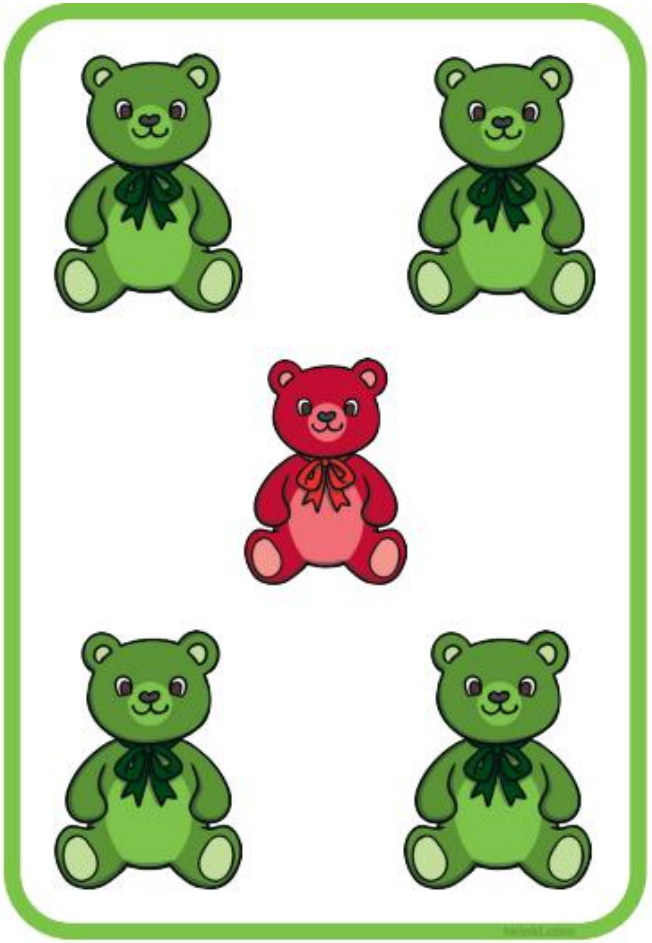
Subitising

(being able to see quantity without counting)

Subitising



How do you know?

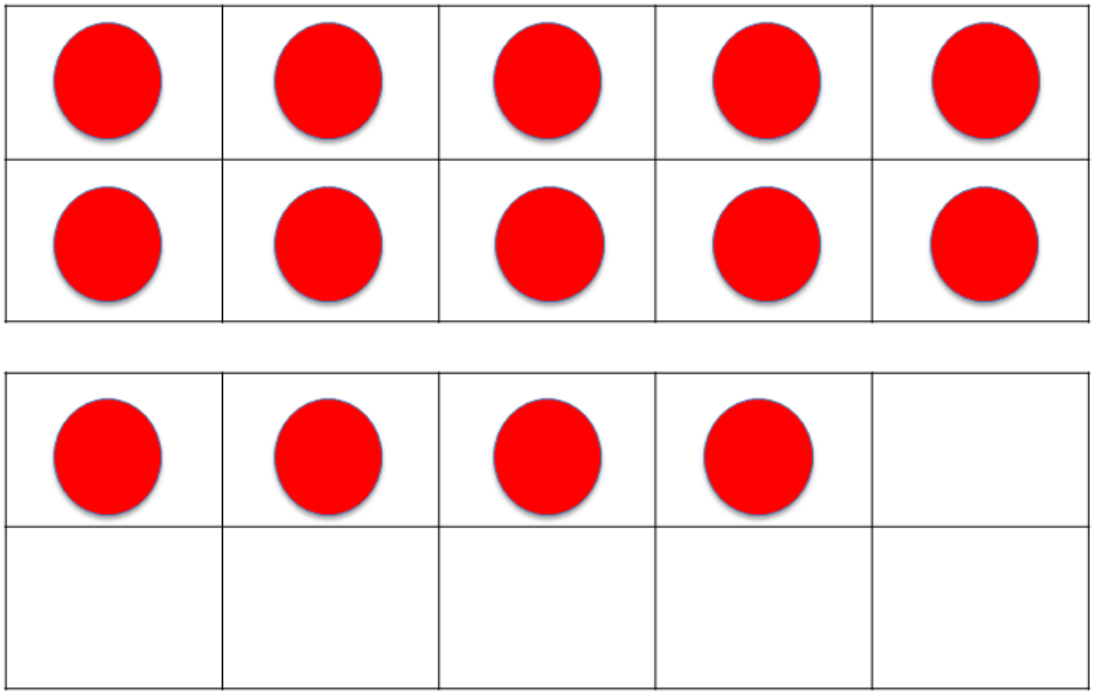


Subtraction: Make 10

How subitising helps…

Solve… 14 – 5 =

Model



Calculations

14 – 5 =

Thank you for listening.

We hope we have given you a useful insight into using CPA approaches within Mathematics.

If you have any questions please don't hesitate to ask or see our school website.