

*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.*

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

“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



That’s not the
way we do it
in 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.

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)

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)

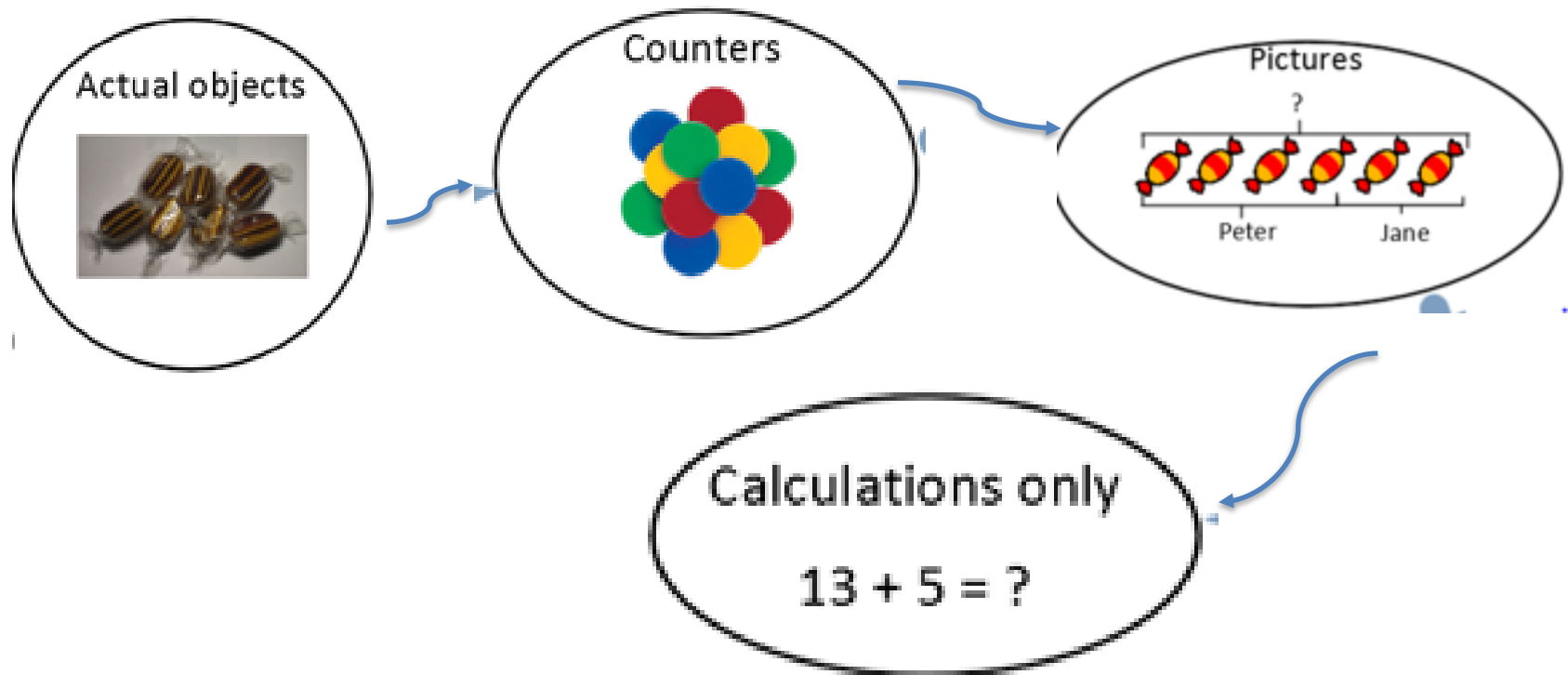
“If we do not use concrete manipulations, then we can not understand mathematics. If we only use concrete manipulations, then we are not doing mathematics.”

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

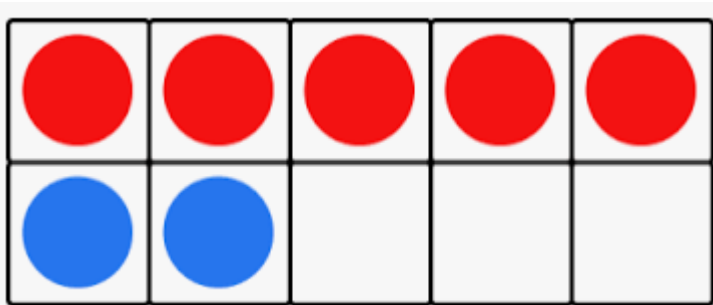
41

Place Value in the Early Years

*Links with number sense and number bonds.
We complete a lot of work on quantity within
quantity.*

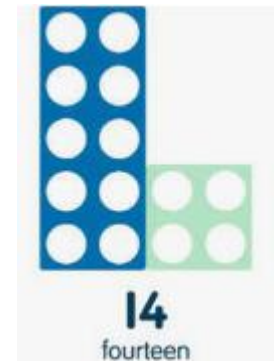
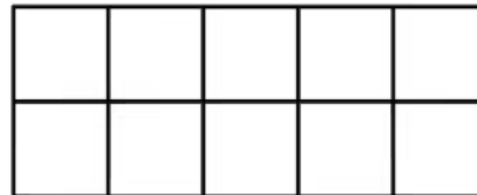
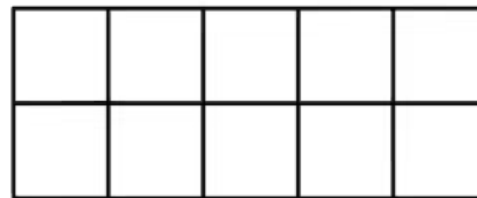


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'5 and some more'
How many more?

Teen Numbers:
10 and some more

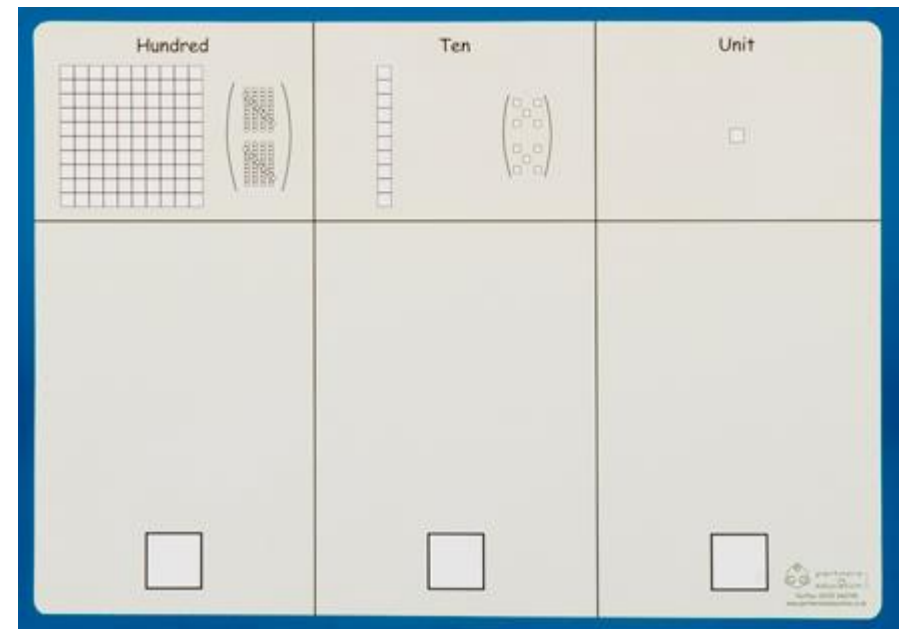


Place Value in the KS1

Looking at what each digit represents



Tens	Ones



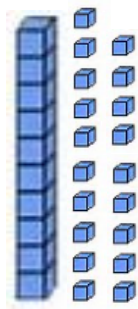
We use place value mats and concrete resources

Place Value in KS1

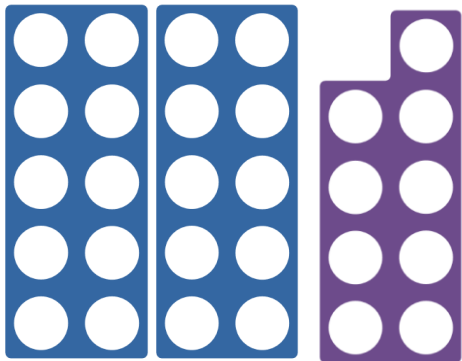
How many ways can you show 29?



Twenty nine

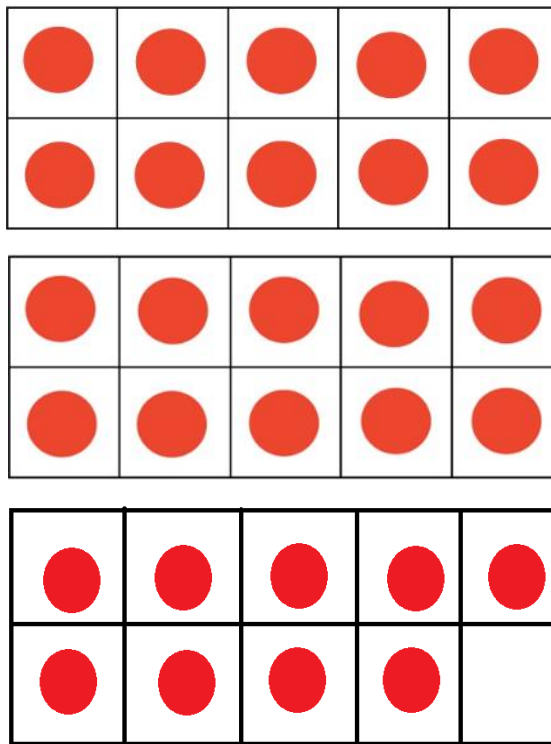


$$20 + 9$$



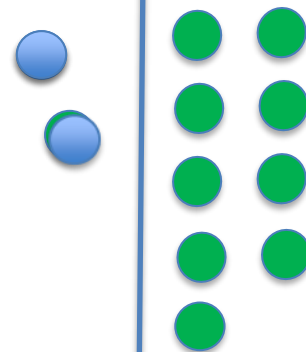
29

$$10 + 19$$



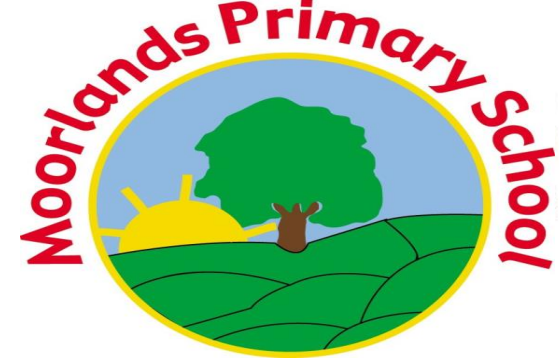
KS2

T O



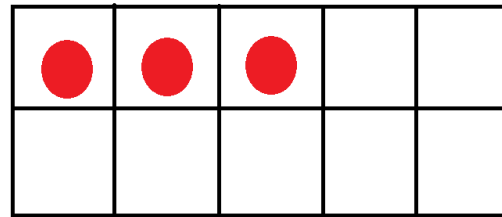
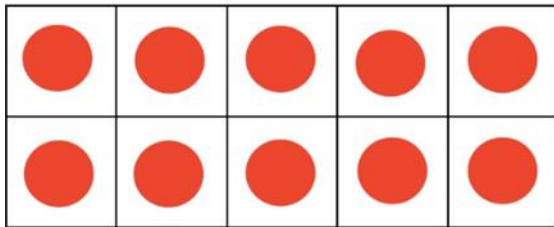
$$10 + 10 + 9$$

Introducing Tens and Ones

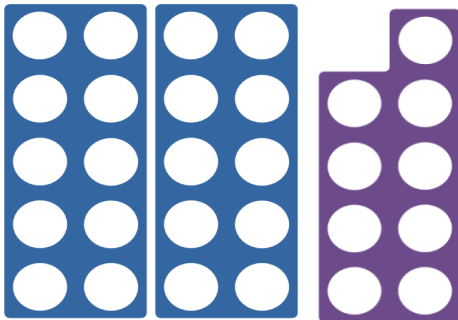


Count straws up to ten. (Rec/Year 1)

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.



How many straws are there?



This then Moves on to Base 10
(summer Y1, Y2 Y3)



Tens and Ones at Home

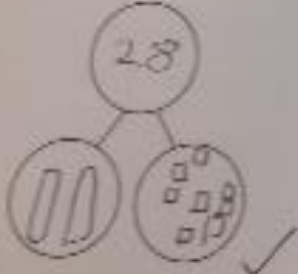
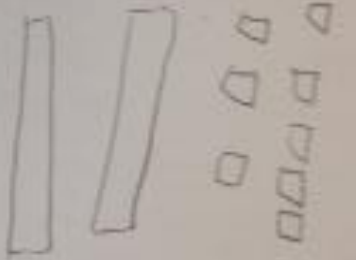


- *Make up your own systems*
- *Tens = sticks, ones = stones*
- *Tens = 1 straw, ones = chopped pieces of straw*
- *Make own version of Base 10 using cut up strips of paper.*

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

Moving to Pictorial



<u>Numerals</u>	<u>Words</u>
28 ✓	twenty eight
<u>Part Whole Model</u>	<u>Draw it</u>
	
Remember the number names! Super. 😊	
YGE: Identify and represent numbers pictorially and abstract.	



Addition

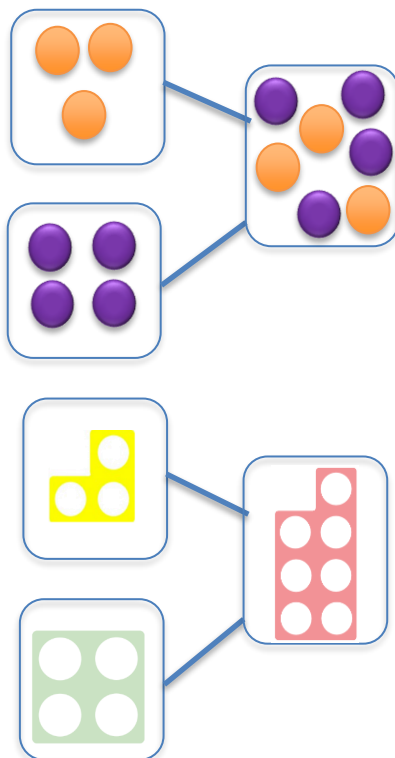
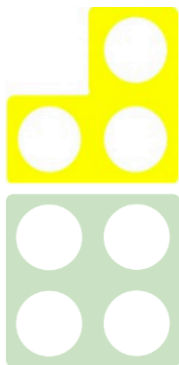
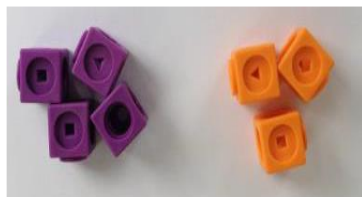
Addition: Part-Whole Model



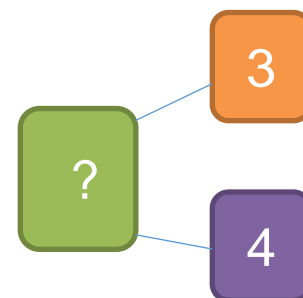
Solve...

$$4 + 3 =$$

Model



Calculations



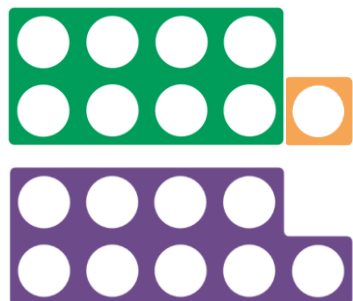
Addition



Solve...

$$8 + 1 =$$

Model



Calculations

$$8 + 1 = 9$$

$$1 + 8 = 9$$

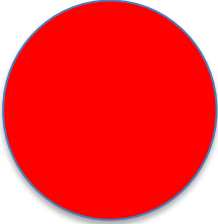
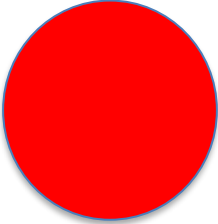
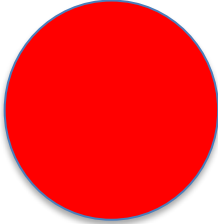
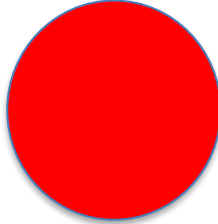

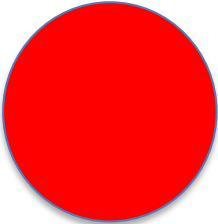
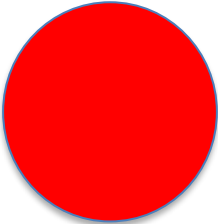
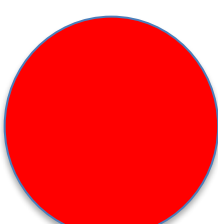
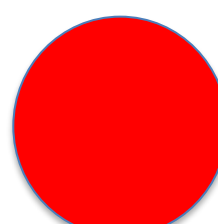

$$8 + \text{[blue square]} = 9$$

$$\text{[blue square]} + 1 = 9$$

Number Bonds



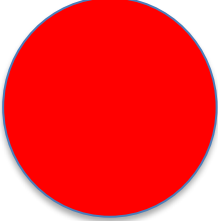
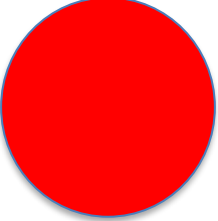
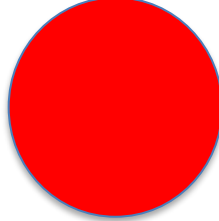
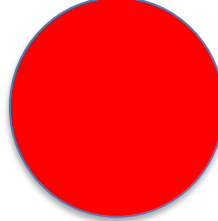

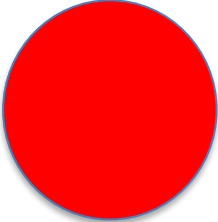




Ten frames: Making 10 in different ways

Number bonds



Ten frames: Making 10 in different ways

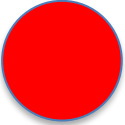
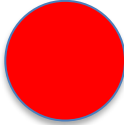
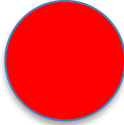
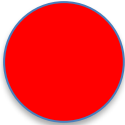
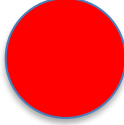
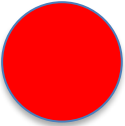
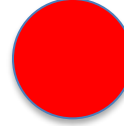



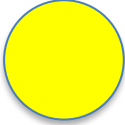
Addition: Regrouping to make 10



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



Subtraction

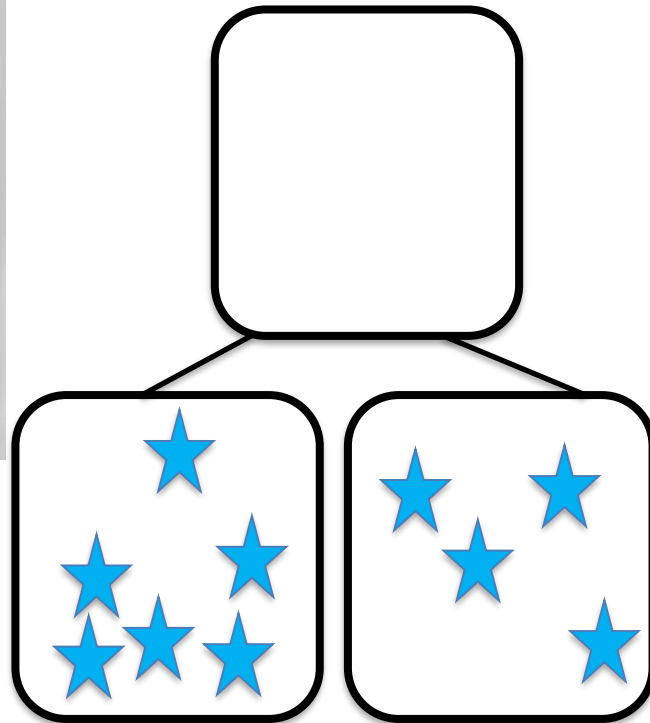
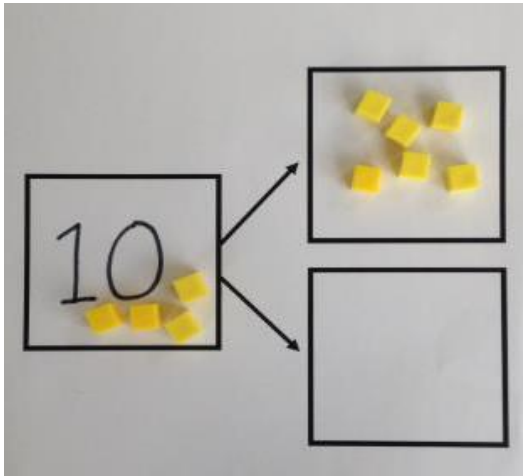
Subtraction- Part whole model



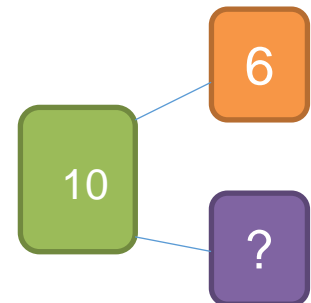
Solve...

$$10 - 6 =$$

Model



Calculations



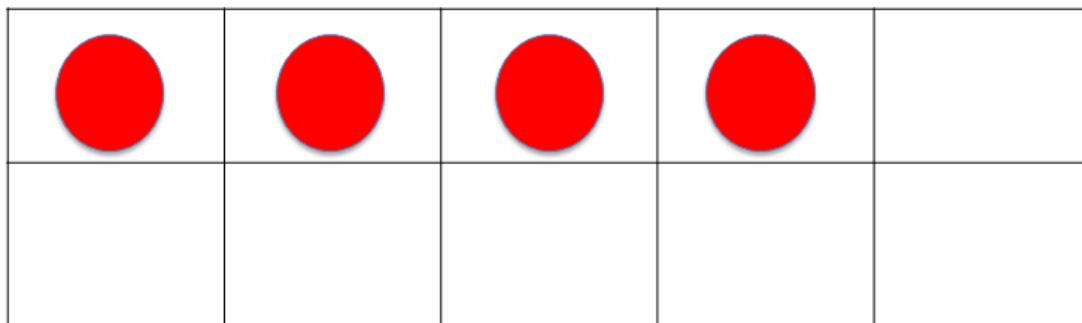
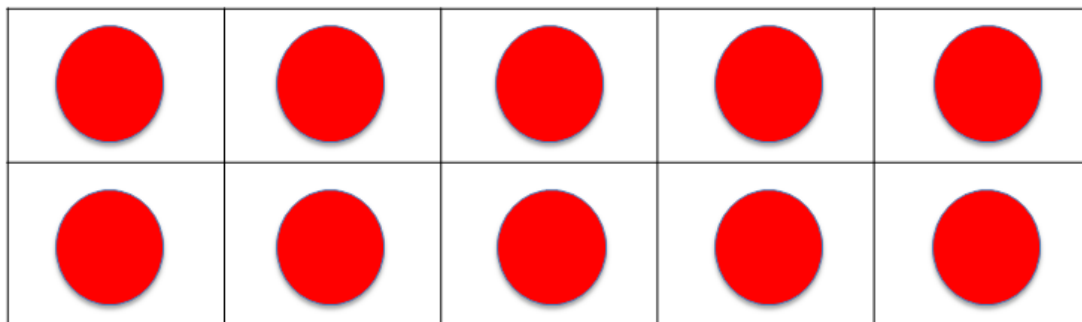
Subtraction: Make 10



Solve...

$$14 - 5 =$$

Model



Calculations

$$14 - 5 =$$

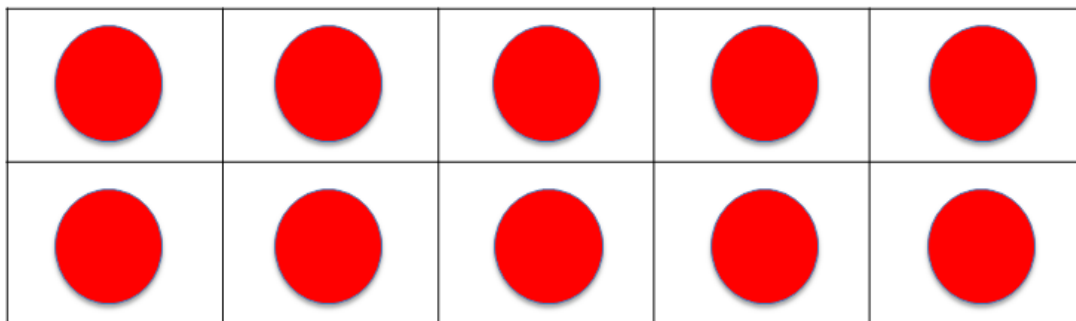
Subtraction: Make 10



Solve...

$$14 - 5 =$$

Model



Calculations

$$14 - 5 =$$

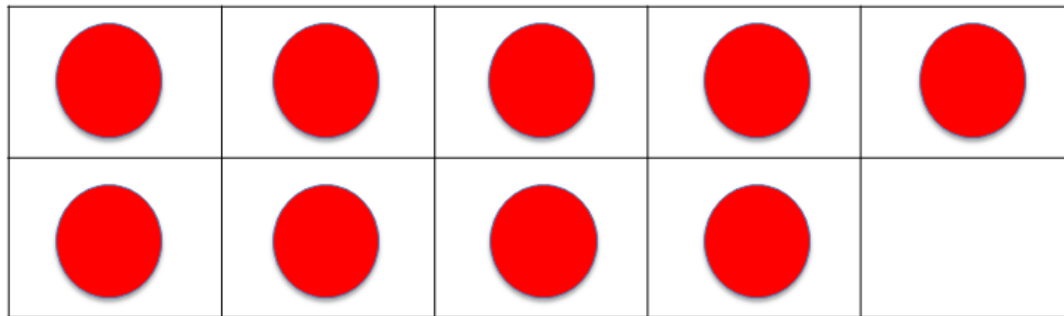
Subtraction - Make 10



Solve...

$$14 - 5 =$$

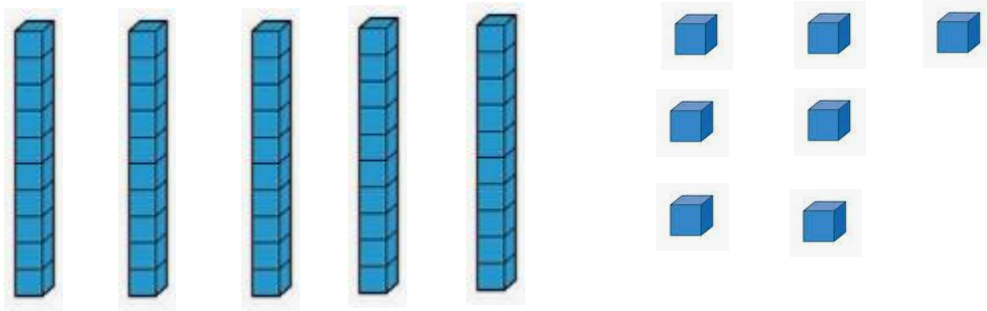
Model



Calculations

$$14 - 5 = 9$$

$$57 - 24 =$$



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

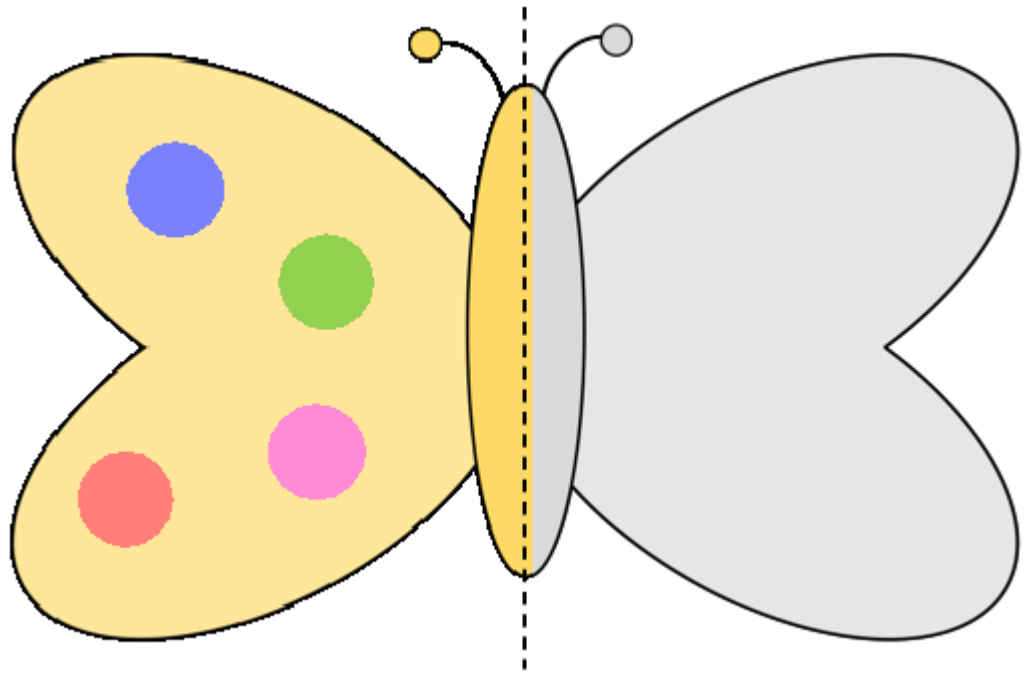
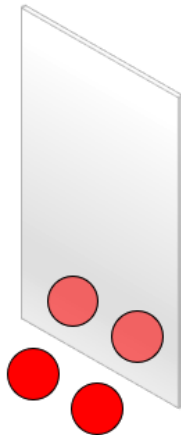
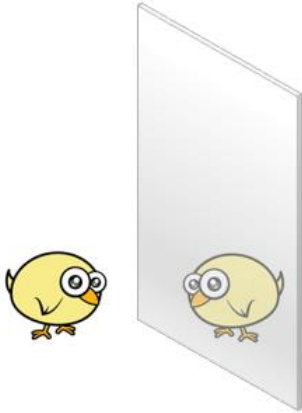




Multiplication

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

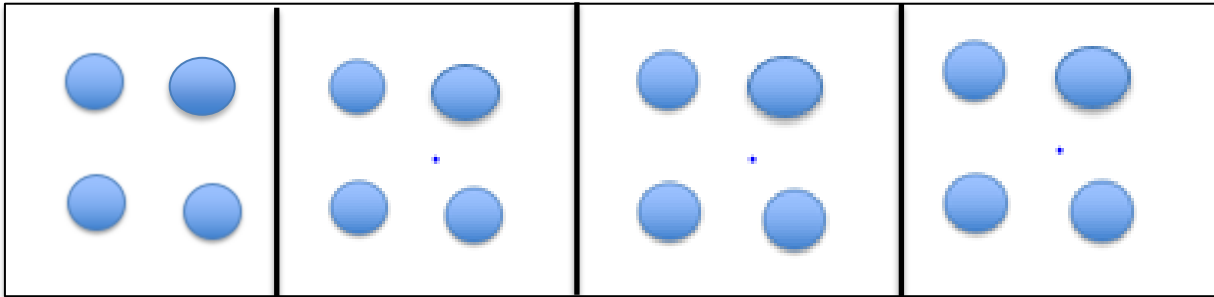


Multiplication Using Concrete



$$3 + 3 + 3 + 3 + 3$$
$$5 \times 3$$

16



$$4 \times 4 =$$

4

8

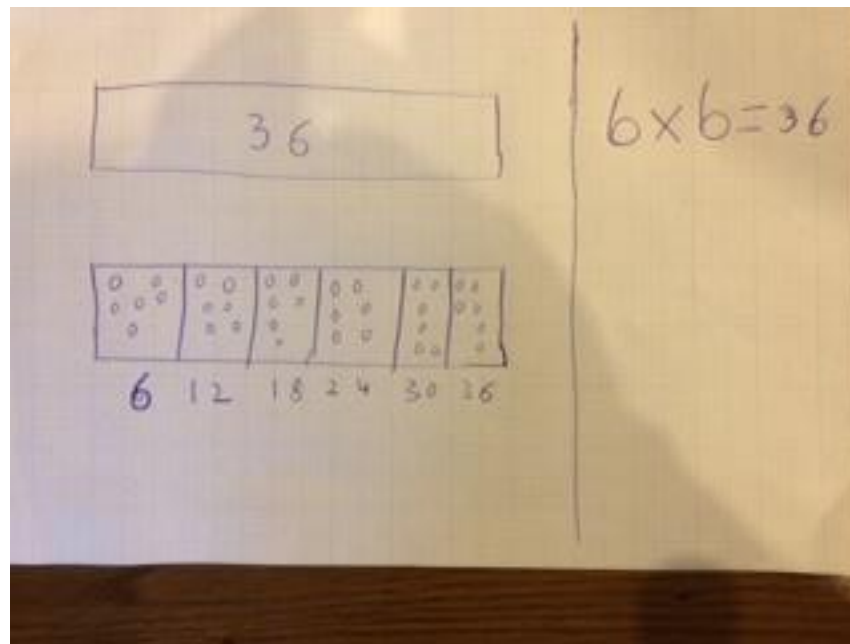
12

16

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.



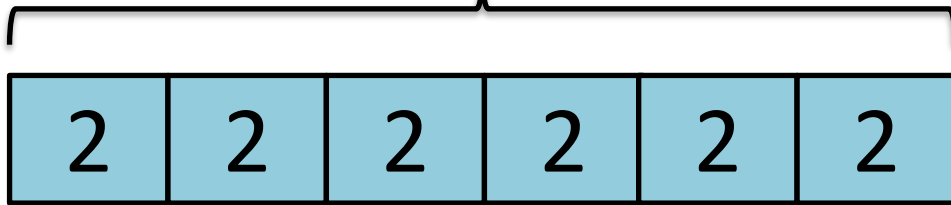
Multiplication



Muffins come in boxes of 2. Peter buys 6 boxes of muffins.
How many muffins does Peter buy all altogether?

Model

?



Calculations

$$6 \times 2 = 12$$

Year 2

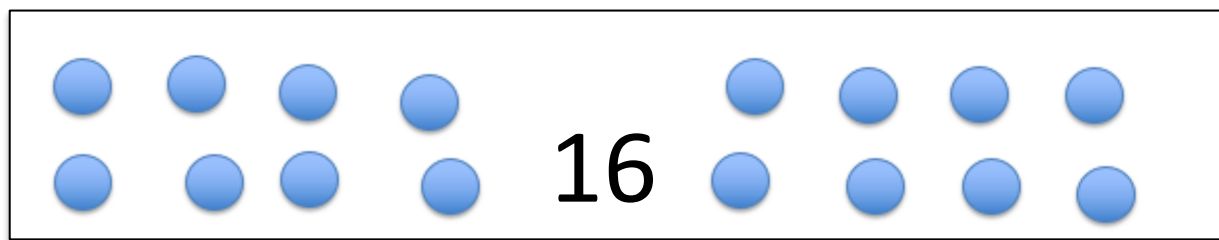
- *recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables*
- *solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.*



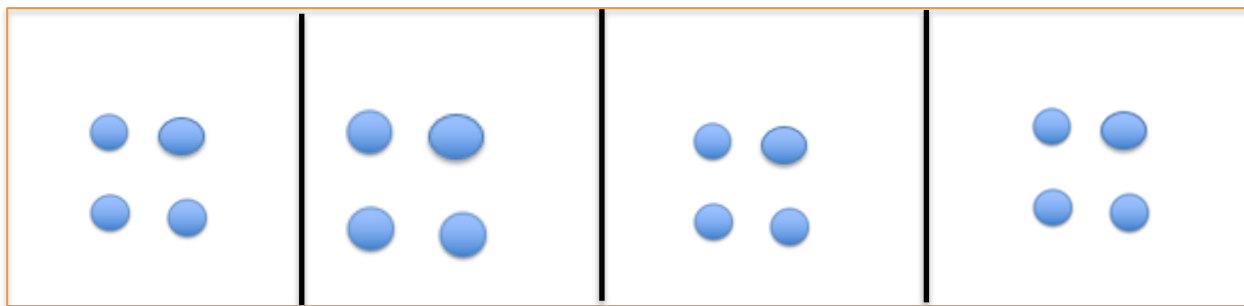


Division

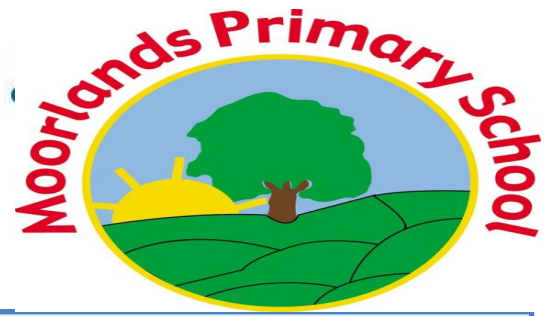
Division Using Concrete



$$16 \div 4 =$$

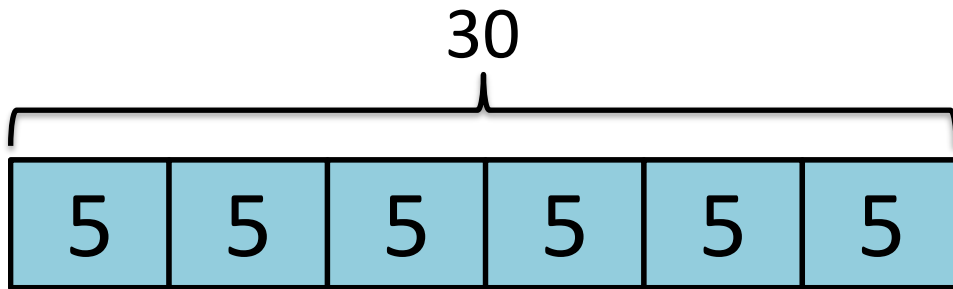


Division (grouping)



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

$$30 \div 5 = 6$$

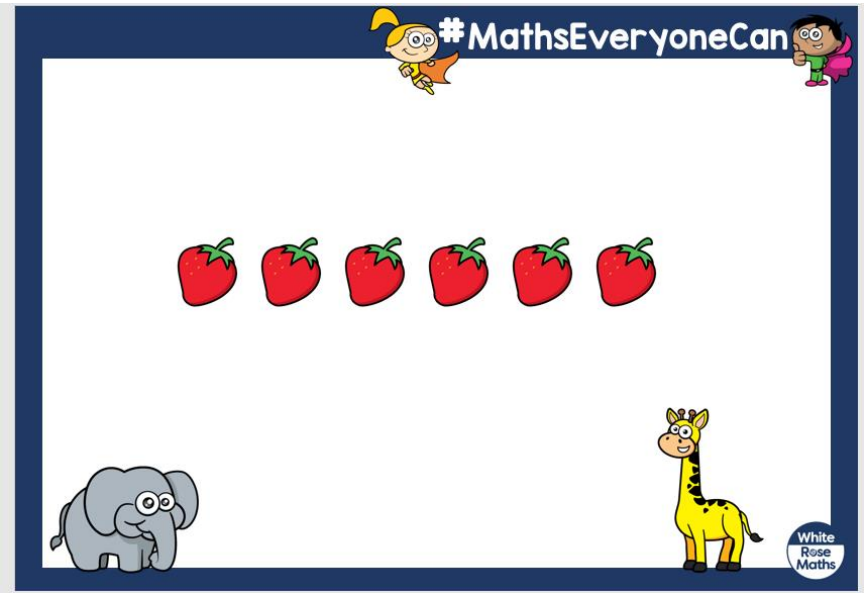
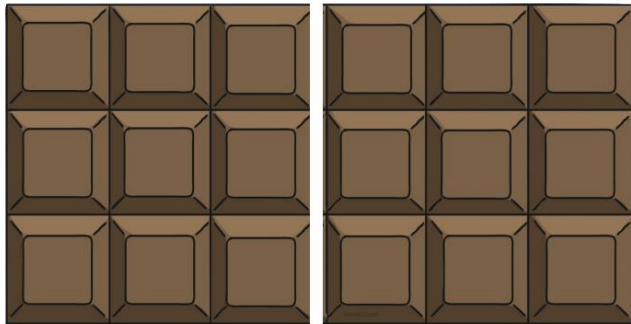
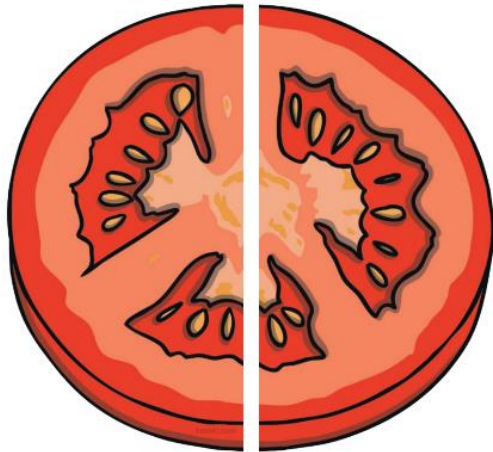
In this version, we are counting how many fives go into thirty.



Fractions

Division/Fractions in Reception

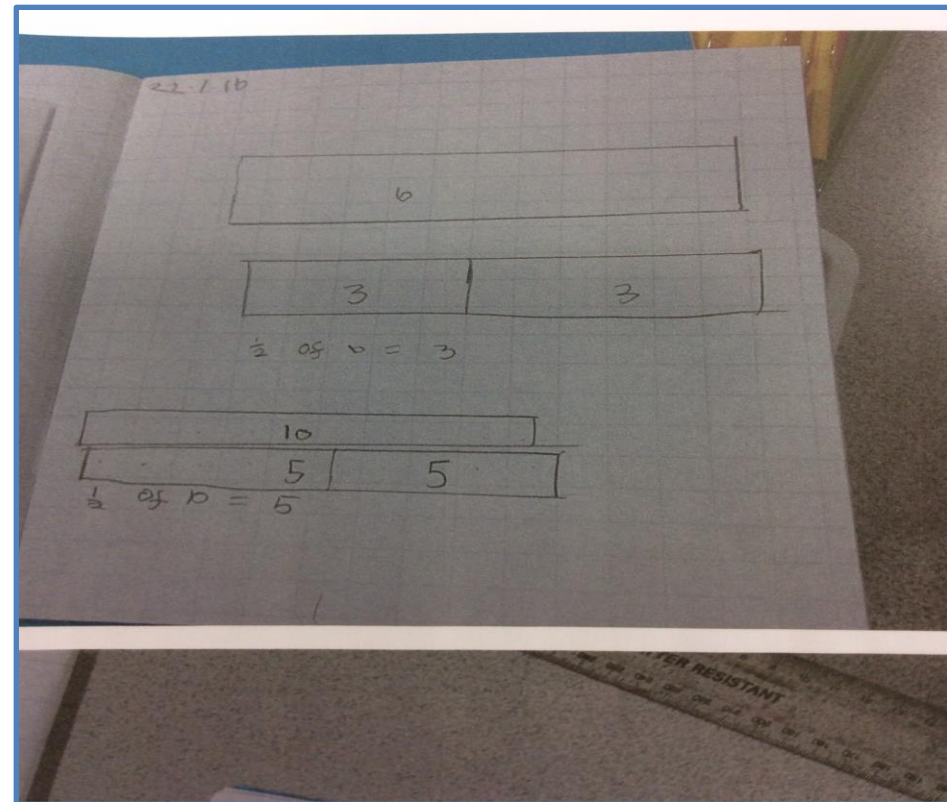
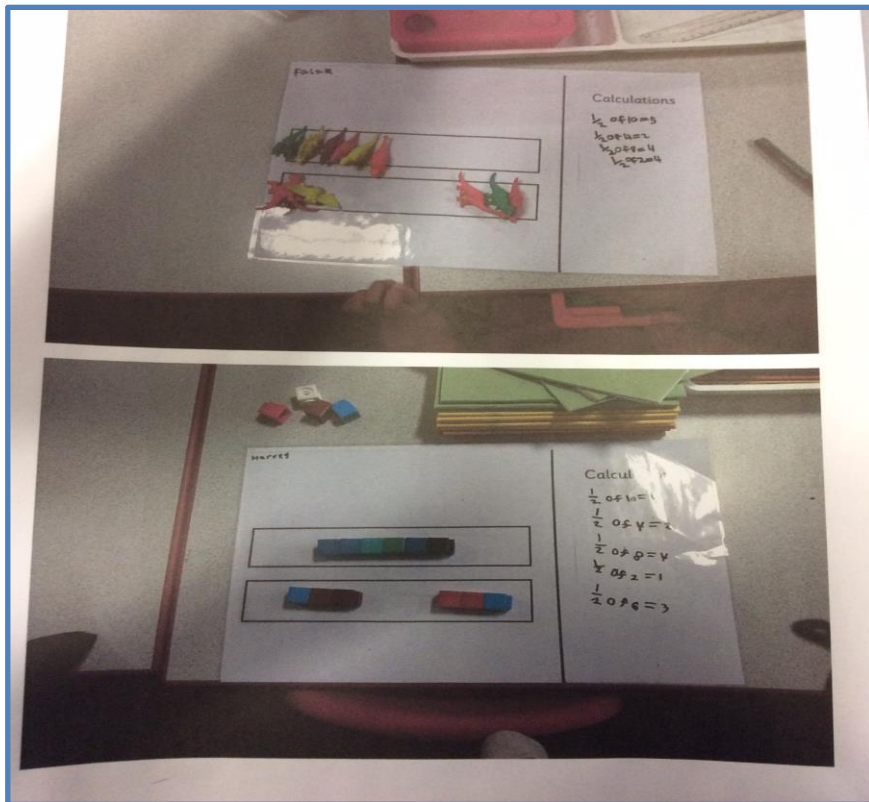
Sharing



Children's Example



Year 1

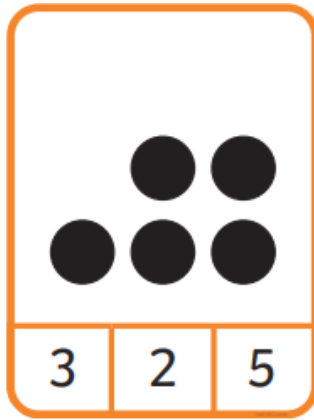
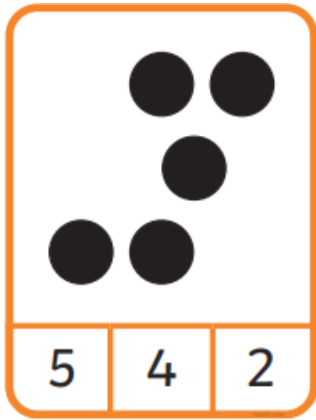




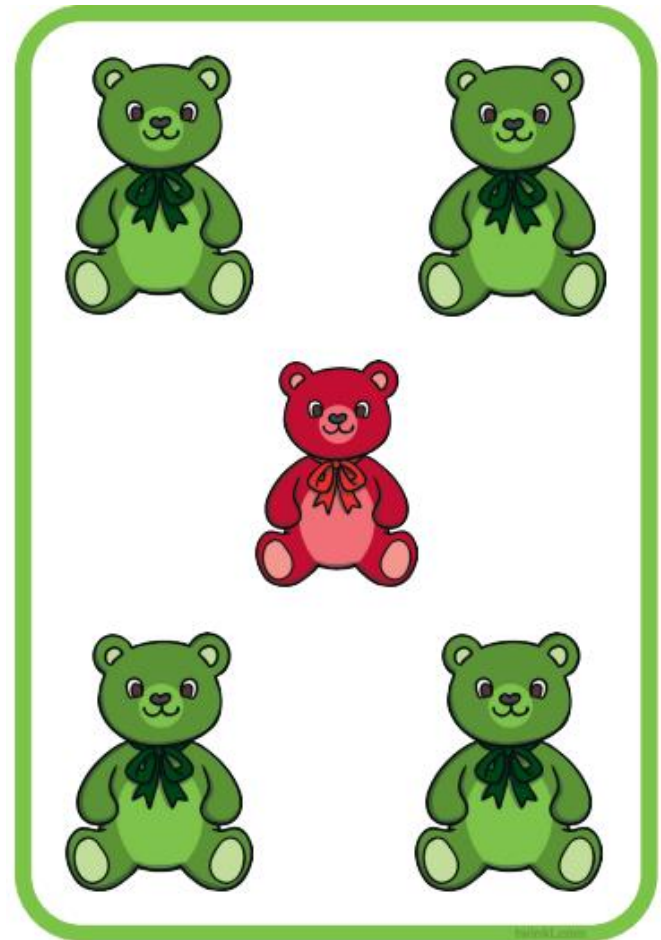
Subitising

*(being able to see quantity
without counting)*

Subitising



How do you know?



Subtraction: Make 10

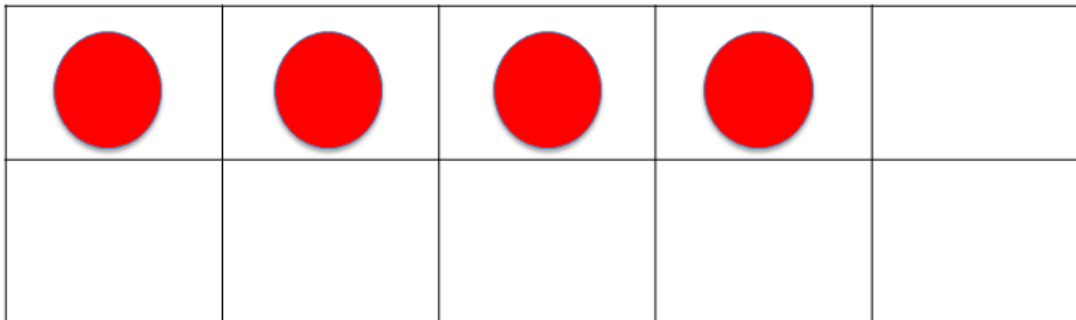
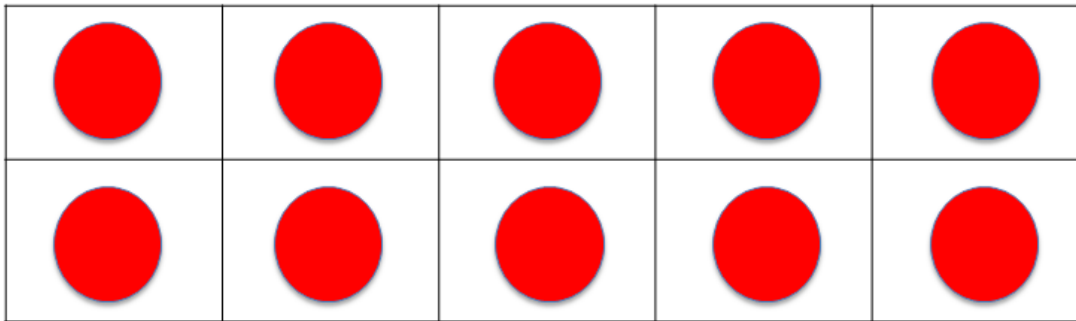
How subitising helps...



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.*