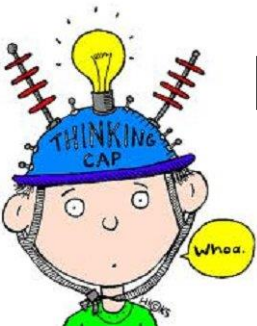


## Developing Number Sense in Reception

# Aims of this morning:

- To give you an overview of the work we've been doing linked to Sue Gifford's research.
- To explore the main elements that can help children develop number sense and fluency when calculating in early years.
- To discuss ways you can support your children at home, including games you can play.





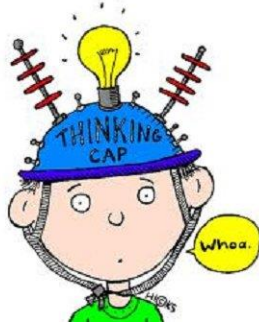
# Sue Gifford



- Sue is a Principal Lecturer in mathematics education at the University of Roehampton. She's previously worked in London schools as a primary teacher and mathematics consultant. She has researched early years maths education, working with practitioners and official bodies.
- She has also published and contributed to books and articles on primary and early years maths education and more recently on dyscalculia and mathematics difficulties.
- Sue is a member of the joint primary committee of the Association of Teachers of Mathematics and the Mathematics Association. Her current research interests include the prevention of mathematics difficulties.



# What is Number Sense?



$$6 + 5 =$$

$$11 - 9 =$$

- Children with number sense can work **fluently and flexibly** with numbers
- They have a sense of what numbers mean and understand their relationship to one another
- They can use numbers in real world situations.
- It develops gradually as a result of exploring numbers, visualizing them in a variety of contexts, and relating them in ways that are not limited by traditional algorithms



# The 4 Cs



These key elements are the basis for the development of children's early number sense and future success in maths:

- Counting
- Cardinality
- Composition
- Comparison

# Counting

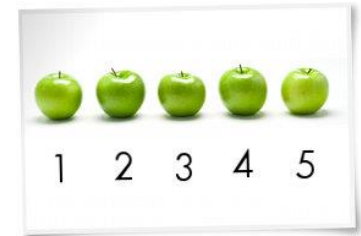
“Knowing numbers” is often used to refer to a child being able to recite the names of numbers in ascending order.

However, rote memorisation does not equate to understanding.

## 3 rules of counting

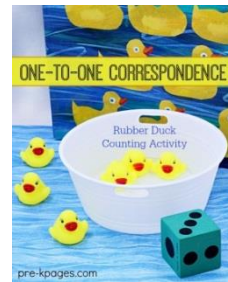
1. Count everything once
2. Say the numbers in the right order
3. The last number you say is how many there are →

**the stopping number**



## One-To-One Correspondence

When counting, the concept of **one-to-one correspondence** is the understanding that each object being counted represents “one more.” It is important for children to be able to count out a number of objects from a larger group set of objects so they understand the **stopping number**.

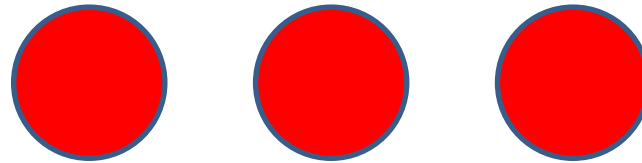




# Recommended progression in counting



1. Count things that are identical in appearance.



2. Count things that can be conceptualised as being the same, but aren't identical. Vary by:

a. colour



b. other non- interfering variables



**Only count (and calculate with) things  
with the same noun.**

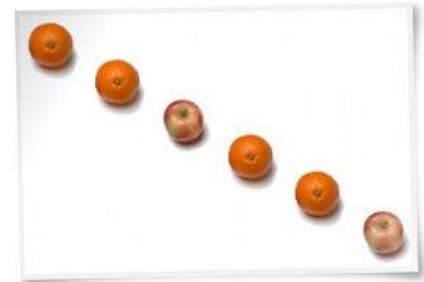
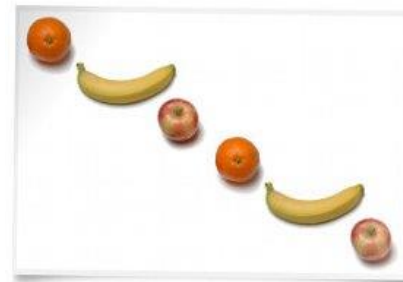
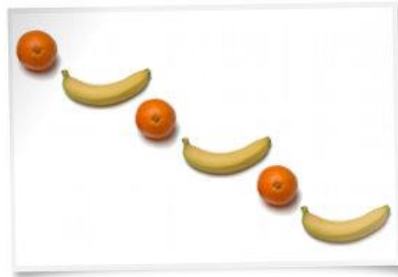
# Counting

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

## Patterning recognition and creation

A pattern is defined as any sequence that repeats at least twice.

Through an **understanding of patterns**, children are able to make **predictions** about what comes next.



Noticing and explaining patterns is an essential skill which is used in maths throughout primary school... and beyond.



# Counting Activities and Games



Maximise opportunities for counting...

in a fun way and with a purpose

- Counting steps/ stairs / jumps– forwards and backwards
- Tidying up - How many things can you pick up?
- Laying the table – Fetch 4 spoons etc.
- Count things around us - How many blue cars are in the car park? How many shoes are lined up in the hallway?
- Aural counting – Count as you hear a noise
- Counting games – **'Ten Nice Things'**



# Counting Activities and Games

## Songs and rhymes

- Five Little Ducks
- Five Little Men in a Flying Saucer
- Five Little Speckled Frogs
- Ten Fat Sausages
- Ten Little Indian Boys
- One, Two Three, Four, Five,  
Once I caught a fish alive



# Counting Activities and Games

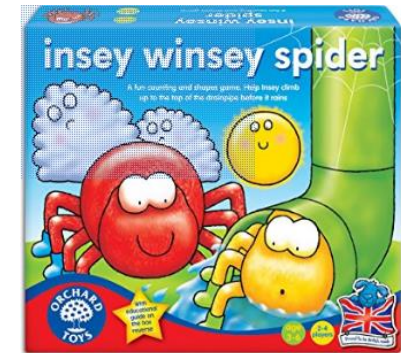
## Story books

- Meg's eggs
- Room on the Broom
- Aliens love Underpants
- Ten in a Bed



## Track games

- The Great Race
- Board games, eg Snakes and Ladders
- Home-made track games – inside and outdoors!
- Orchard Toys – eg Insey Winsey Spider



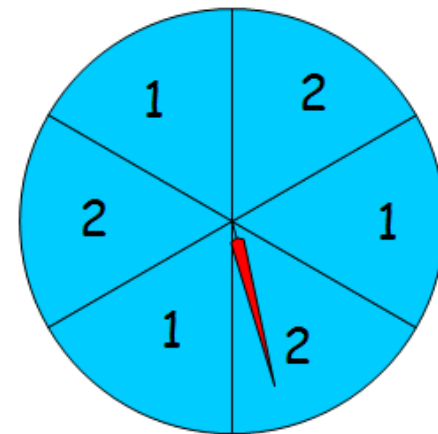


# Counting Activities and Games



## The Great Race

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
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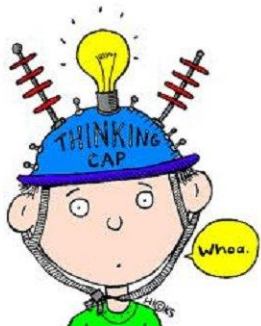


# Cardinality

Cardinality means the quantity or total number of items in a set .

This can be determined by subitising (for very small sets) or counting. While subitising allows children to perceive the cardinality of small sets, counting requires them to understand that the last number in the counting sequence represents the quantity of the set.

## 'The 8-ness of eight'





# Cardinality



## Subitising

The process of immediately knowing how many objects are in a small group without needing to count them.

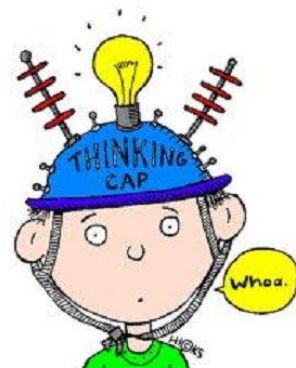
### Perceptual Subitising

Being able to 'just see' how many are in a group, without counting.



Let's play...

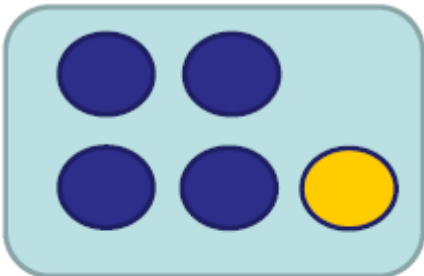
# Dotzi



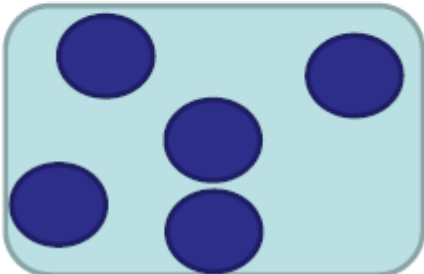
# Subitising



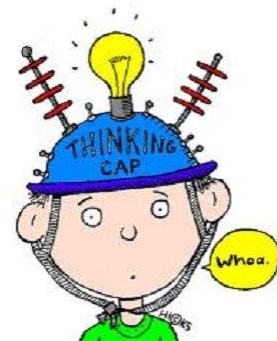
Familiar and structured dot patterns



structured dot patterns

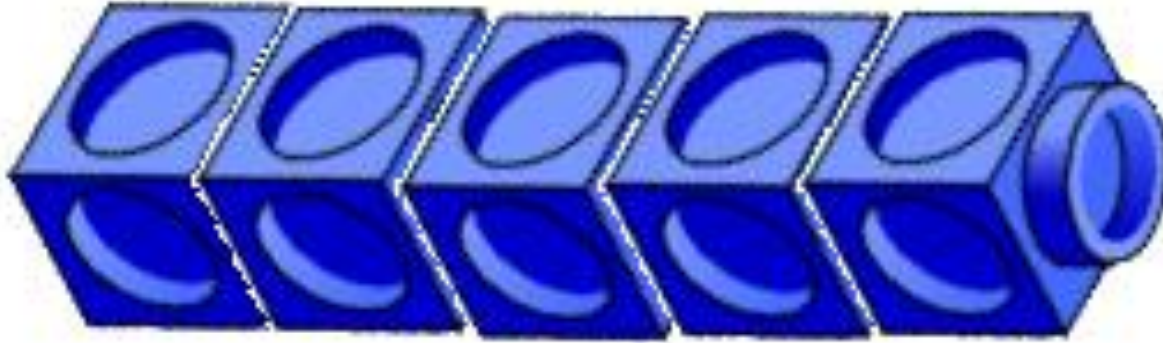


unstructured dot patterns



# Composition

## Part whole relationships



5 is the whole.

2 is a part and 3 is a part.

Your turn!

Why might it be useful to use cubes of the same colour?

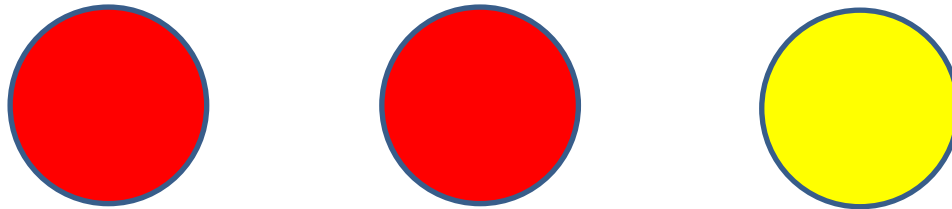


# Composition

## Part whole relationships

Two-colour counters can also be great for developing understanding of this concept.

They can help young children understand the concept of equality.



**Can you see the one hiding in the three?**

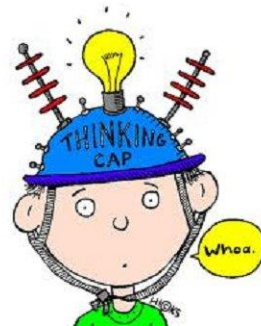
# Composition

## Conceptual Subitising

Being able to see numbers within numbers (eg 6 is made of 4 and 2). This helps to develop efficient calculating skills.



This can be described as ‘numbers hidden within numbers’.



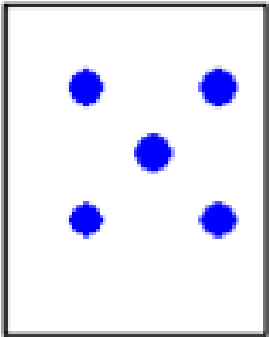


# Composition

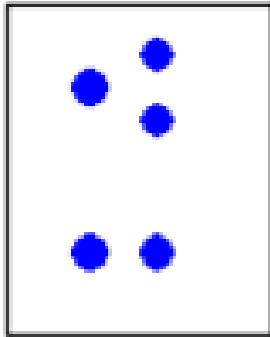
## Conceptual Subitising



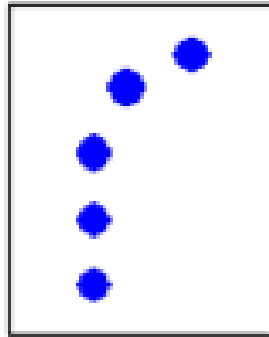
How many are there?  
How do you know?



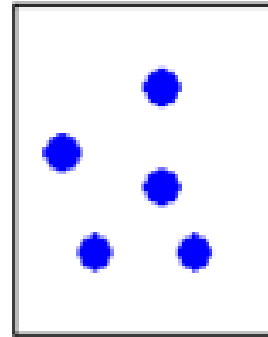
A



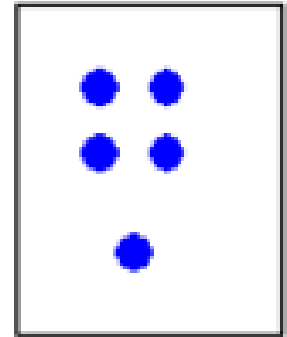
B



C



D



E

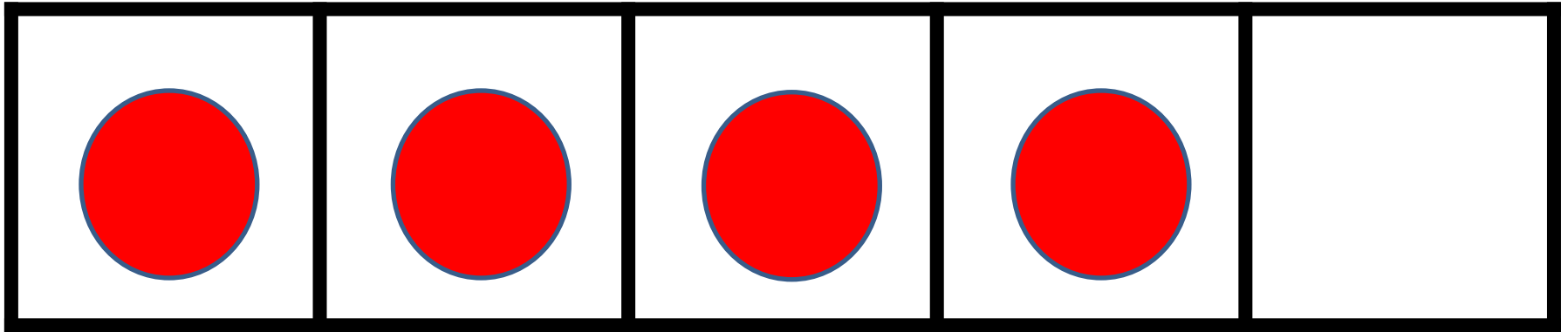


# Composition

## Conceptual Subitising



**How many are there?**  
**How do you know?**



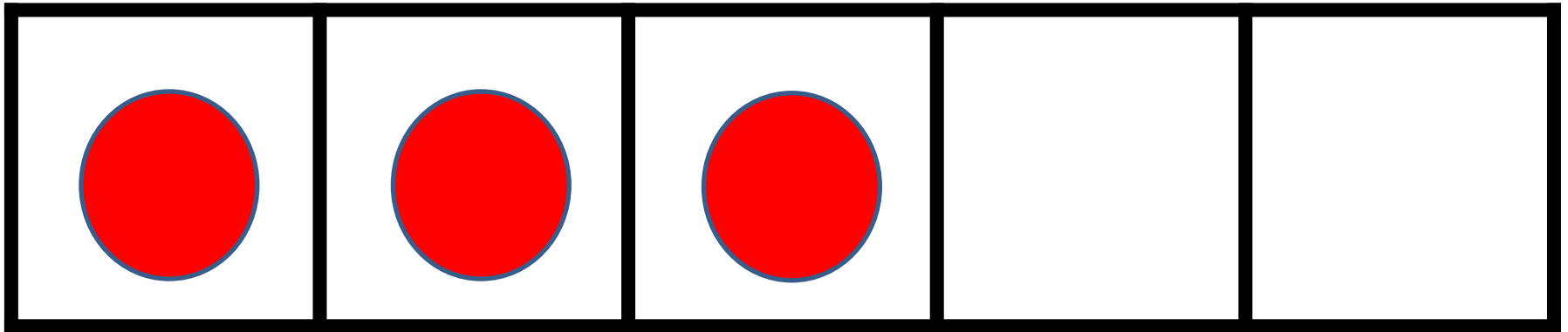


# Composition

## Conceptual Subitising



**How many are there?  
How do you know?**



**We're also beginning to compare!**

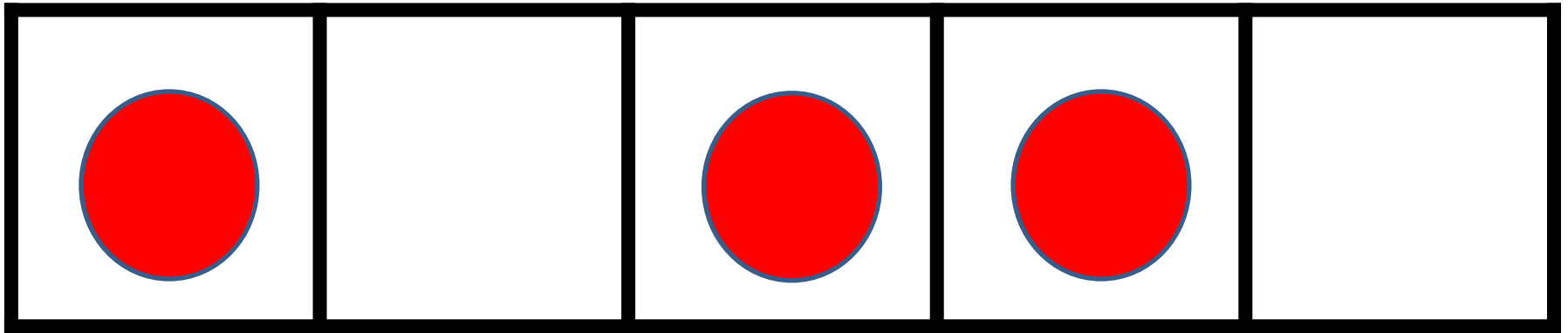


# Composition

## Conceptual Subitising



How many are there?  
How do you know?



# Cardinality/ Composition

Let's play...

## Bunny Ears



# Cardinality/ Composition

The story of 5



$0 + 5$



$1 + 4$

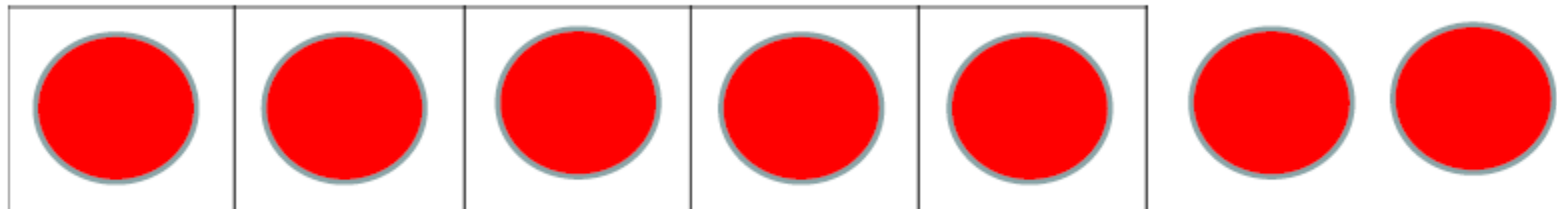
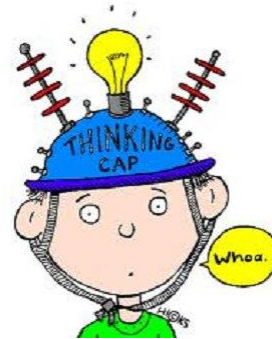
## Box games



# Cardinality/ Composition

## Securing numbers to 5 and beyond

**How many are there?  
How do you know?**

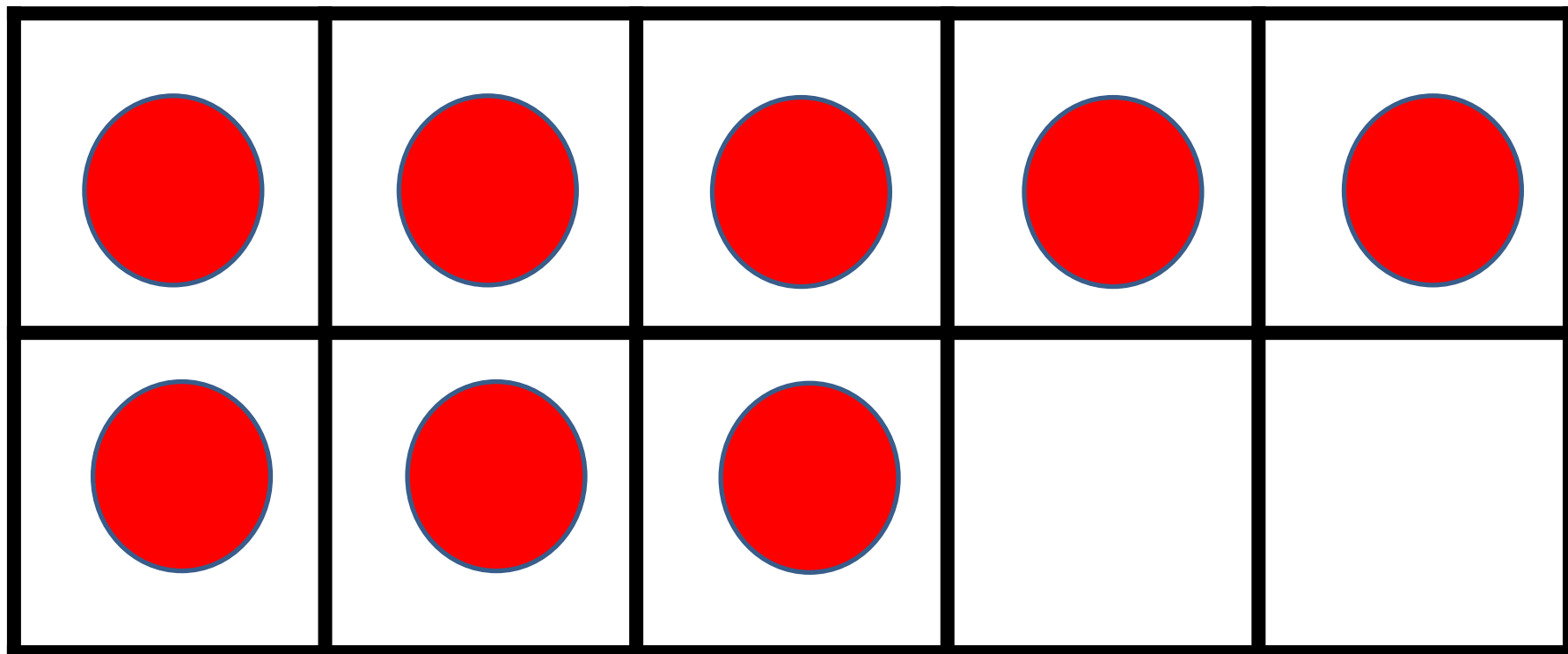


# Cardinality/ Composition

## Conceptual Subitising

How many are there?

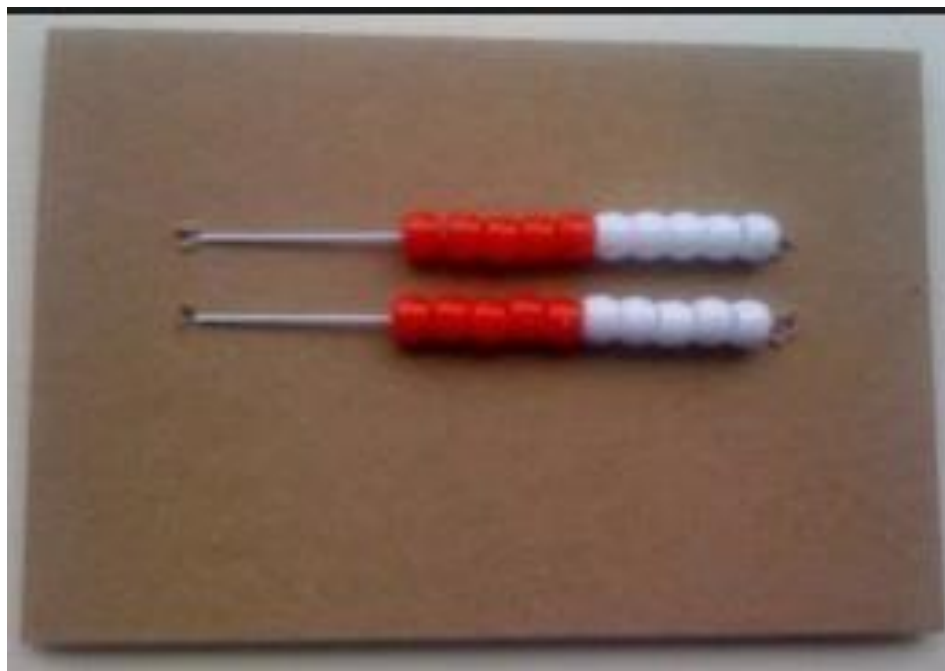
How do you know?



# Cardinality/ Composition

## Conceptual Subitising

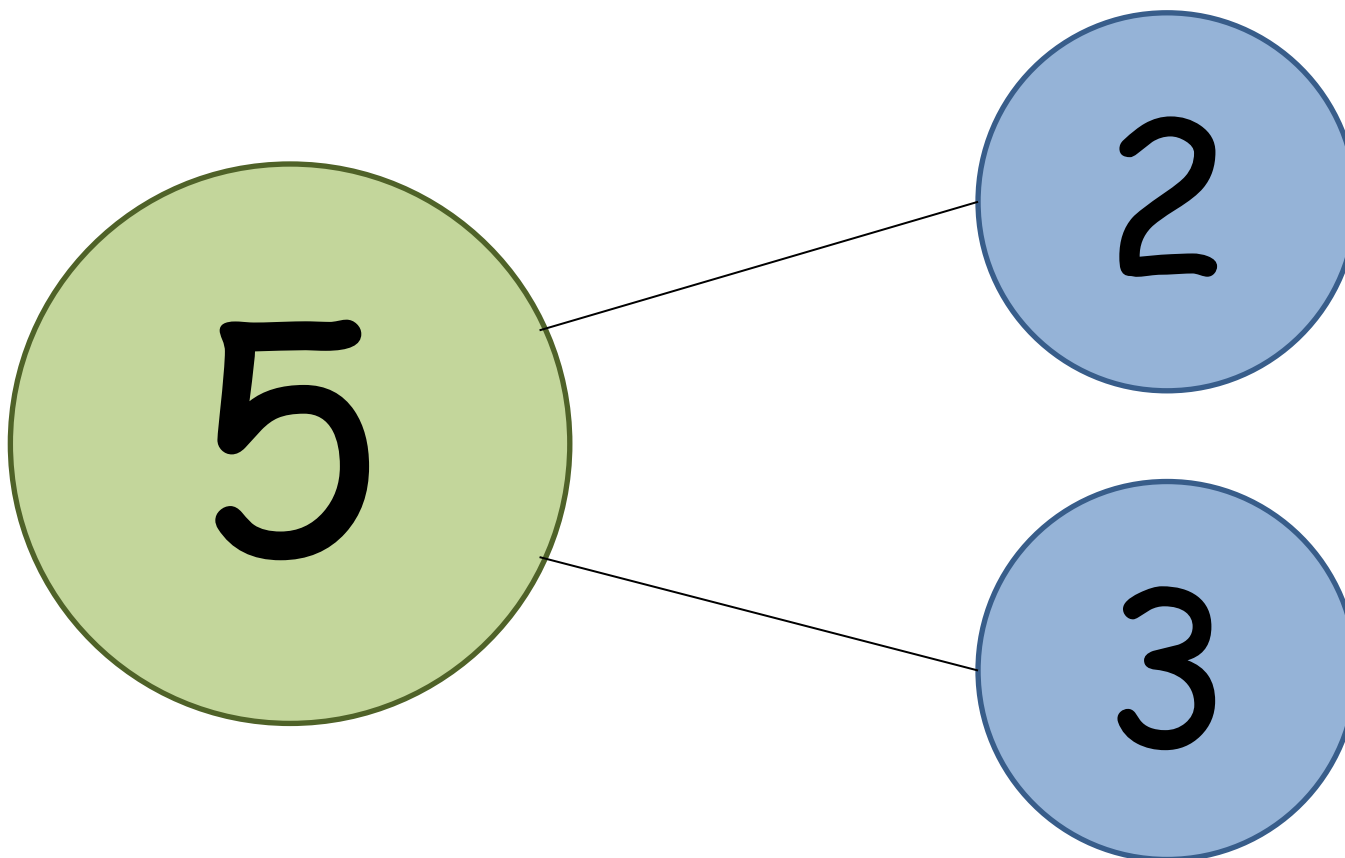
How many are there?  
How do you know?



Resources you can make at home!

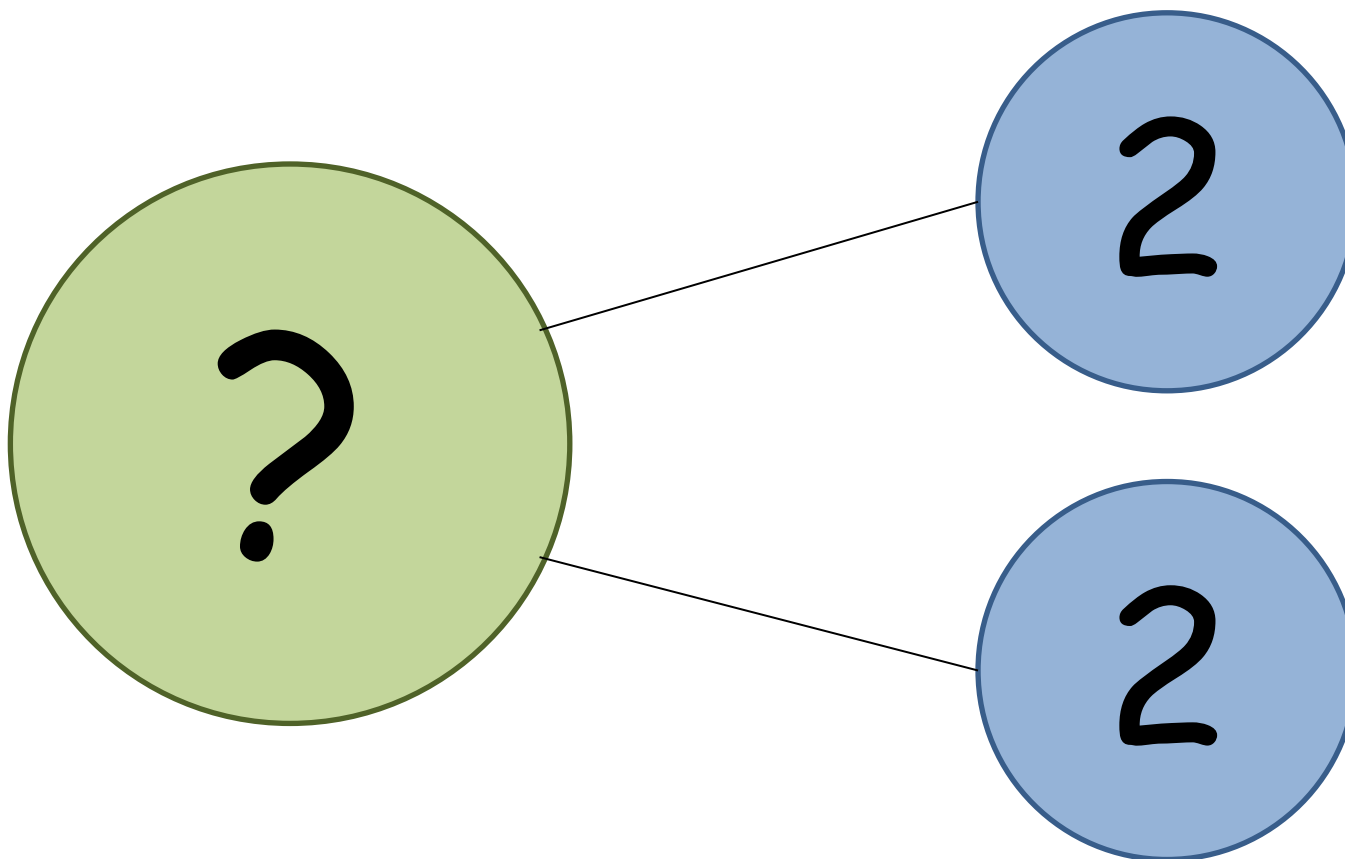
# Cardinality/ Composition

The part whole model



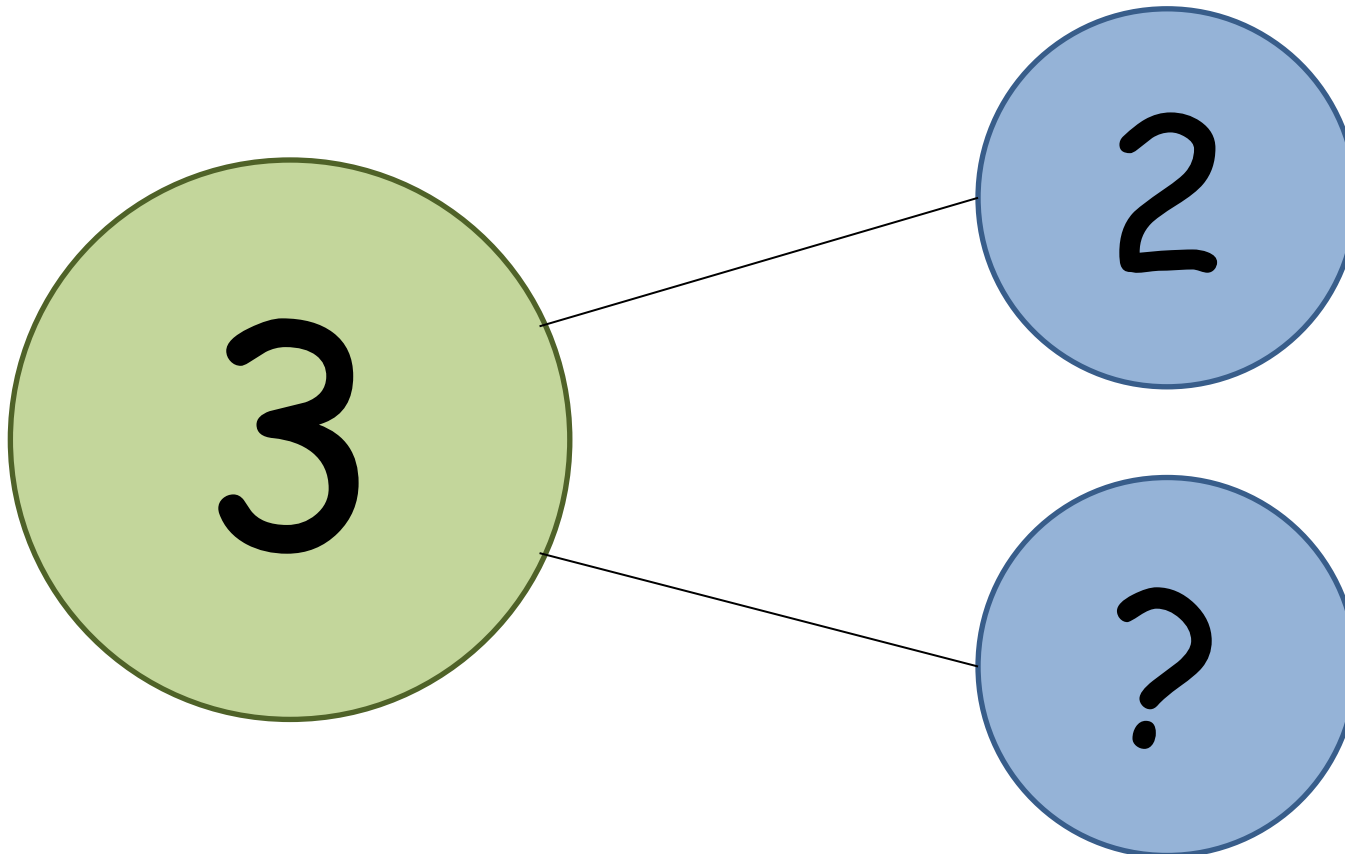
# Cardinality/ Composition

The part whole model



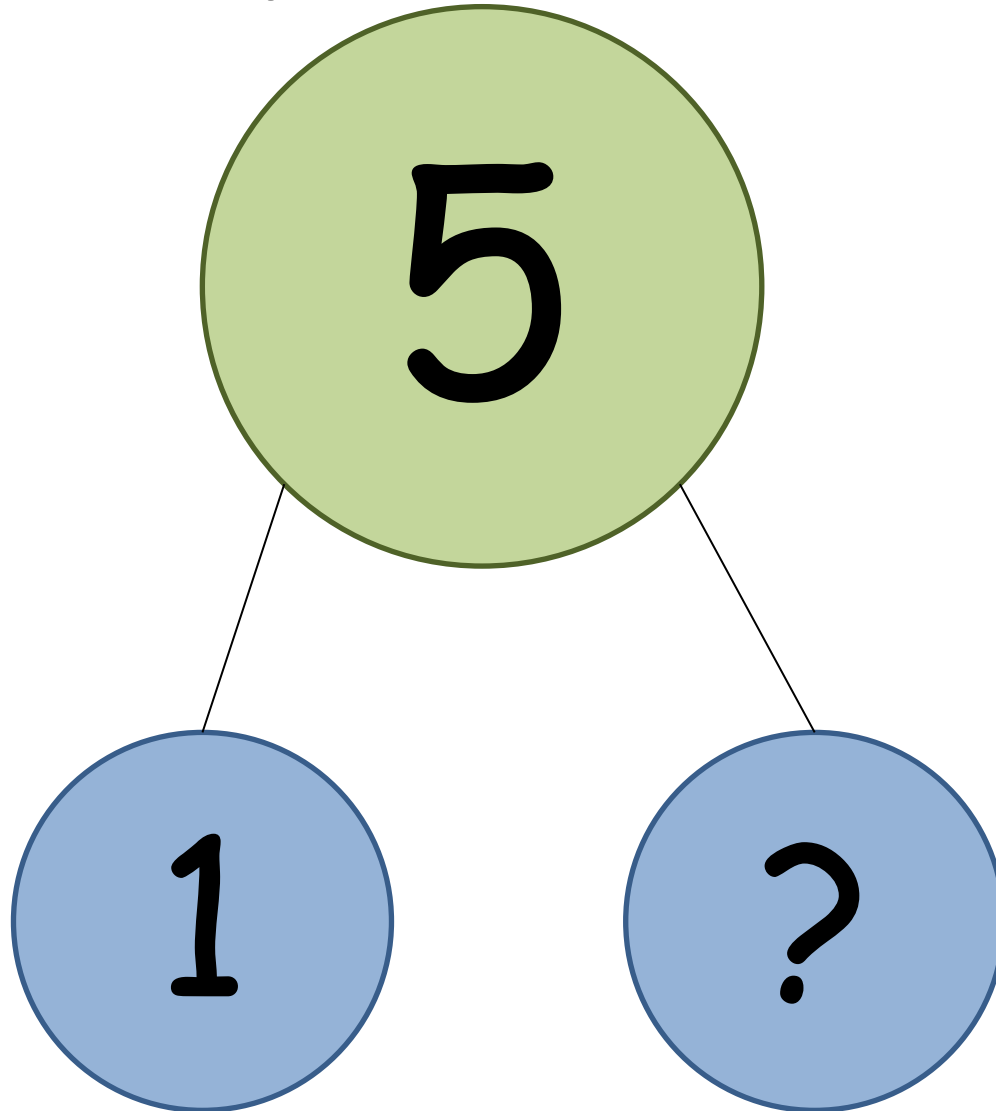
# Cardinality/ Composition

The part whole model



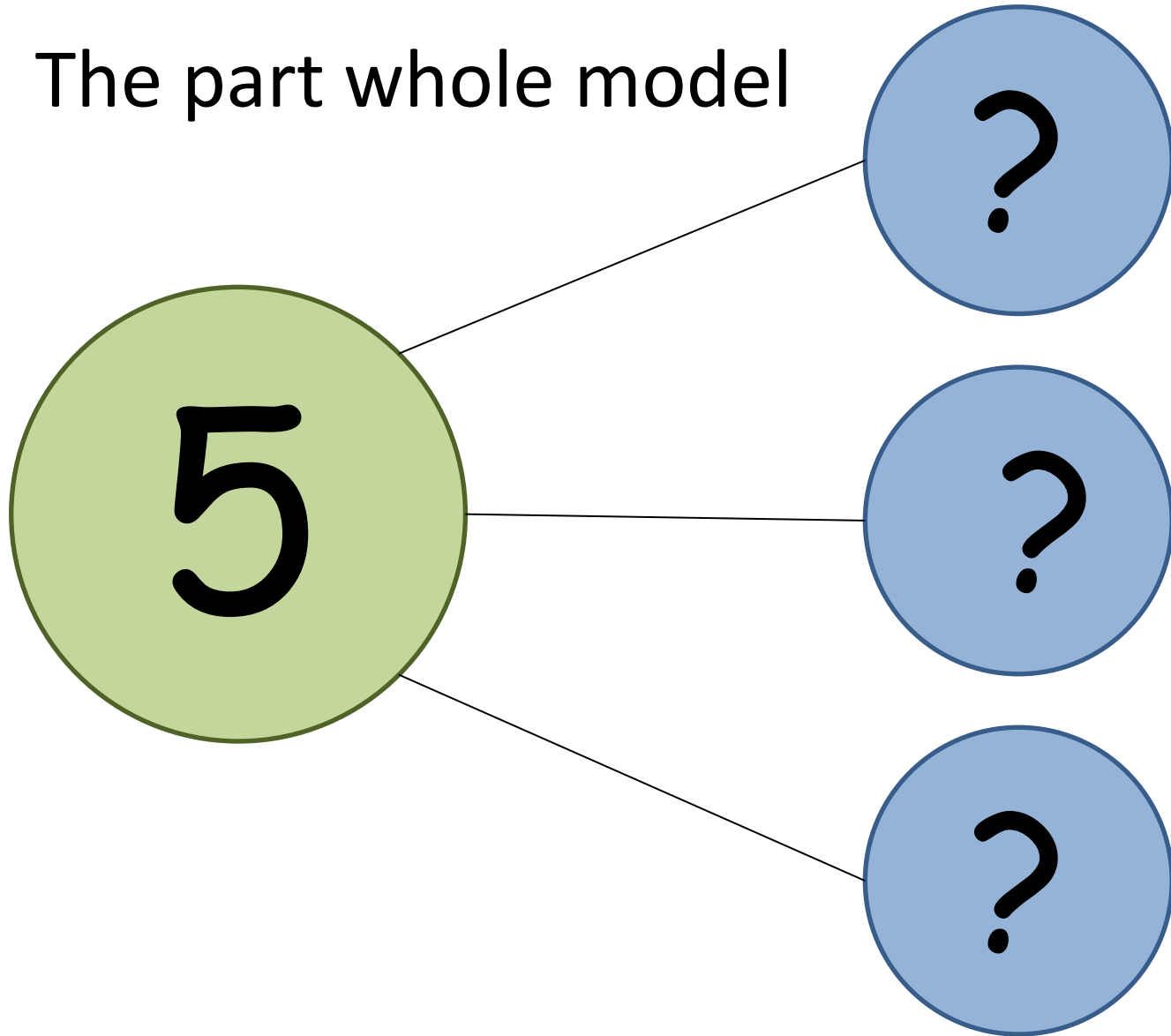
# Cardinality/ Composition

The part whole model



# Cardinality/ Composition

The part whole model



# Cardinality and Composition Activities and Games

- Dotzi
- Bunny Ears
- Box games
- Apps – eg Number Flash (free)  
Little Digits (£2.99)



# Comparison

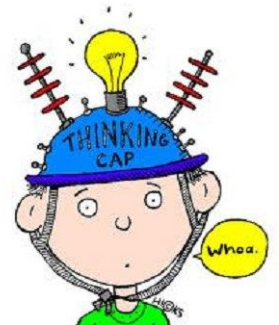
When we ask children to compare numbers, we are asking them to examine the difference, to decide if one number is greater than, or equal to another number. The magnitude.

Having a good sense of number magnitude is an important indicator of future success in maths.

Which is larger:  
3 or 6?

How close can  
you get to 10?

**How do you know? Convince me!**



# Comparison Activities and Games

**Sorting activities** - the child's ability to reason and explain how he/she has sorted objects is the important skill.

How have you organised your objects? Can you explain how they are different? How are they the same?

- Can you sort the buttons in the sewing basket?
- Can you help sort out the washing in the washing basket?
- Can you organise your toys?



# Comparison Activities and Games

**Who has the most? Who has the fewest?**

**How do you know?**

- Sharing sweets/chocolates
- Building with blocks. Can you make a taller tower?

**How many bricks do you have?**

- Building snakes with play dough and using blocks to measure how long they are.

**Which is the longest snake and how do we know?**

**Use numeral dice, as well as dot dice.**



# Comparison Activities and Games

## Estimating activities

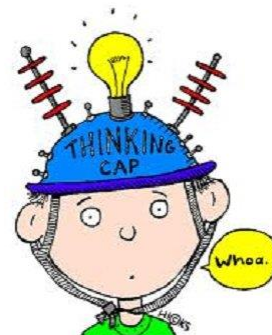
- How many sweets are in the jar?
- How many apples are in the fruit bowl, or how many do you think will fit in the bowl?
- How many slices of cake are there? etc.



- Build a den using blocks or boxes. How many teddies do you think will fit in the den?

# How can you help at home?

- Involve your child in everyday maths; talk about numbers/ maths around you.
- Play lots of games, including ordinary board games.



# To finish...

‘ PLEASE, PLEASE... NEVER say that you are bad at maths ... not anywhere within a 100-mile radius of any child you ever want to influence.’

Naomi Sani

‘How to do maths so your child can too’

