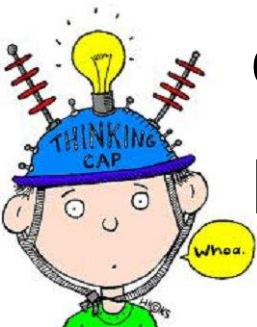


Developing Number Sense and Fluency in KS1

Aims of this morning:

- To give you an overview of the work we've been doing as part of an exciting research project with Herts for Learning.
- To explore the main elements that can help children develop number sense and fluency when calculating in KS1.
- To discuss ways you can support your children at home, including games you can play.



What is Number Sense?

$$19 + 7$$

$$21 - 16$$



Developing Number Sense through fluency

Phase 1

Counting Strategies

*Uses objects or
verbal counting*

Counts 6 beads out, then
counts out 5 beads – then
counts all the beads

Phase 2

Reasoning Strategies

*Uses known facts
and relationships*

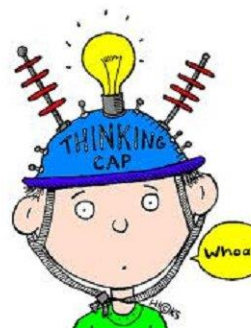
I know that $5 + 5 = 10$, and 6 is
one more than 5, so $6 + 5$ must
be one more than 10

Phase 3

Securing adaptive fluency

Fast and accurate

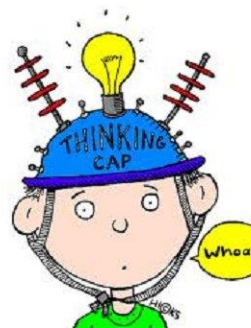
$$6 + 5 = 11$$



Can we predict children's future maths ability?

Research has found 3 key components

- Having a good sense of the size of numbers (Number Magnitude)
- Being able to subitise
- Being able to invent strategies



Number Magnitude

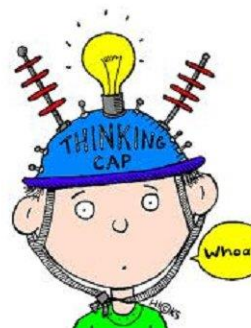
‘Immature number line representation is linked to both lower mathematical performance, but also with hindering learning of new mathematics.’

(Booth & Siegler , 2008)

Which is larger:
3 or 6?

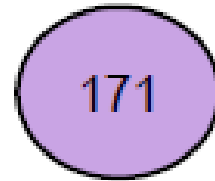
Which is larger:
 $\frac{1}{3}$ or $\frac{1}{6}$?

How close can
you get to 1?

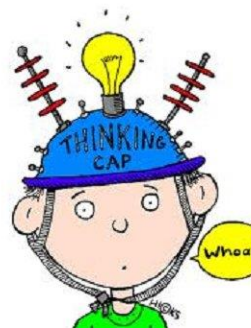


Number Magnitude

It is important to develop linear estimation.



Where would you place the
number 171?



Deconstructing and reconstructing

- Explicit teaching strategies

What can't this number be?

What could this number be?

This number could be...because...

This number can't be...because...

What could this number be?

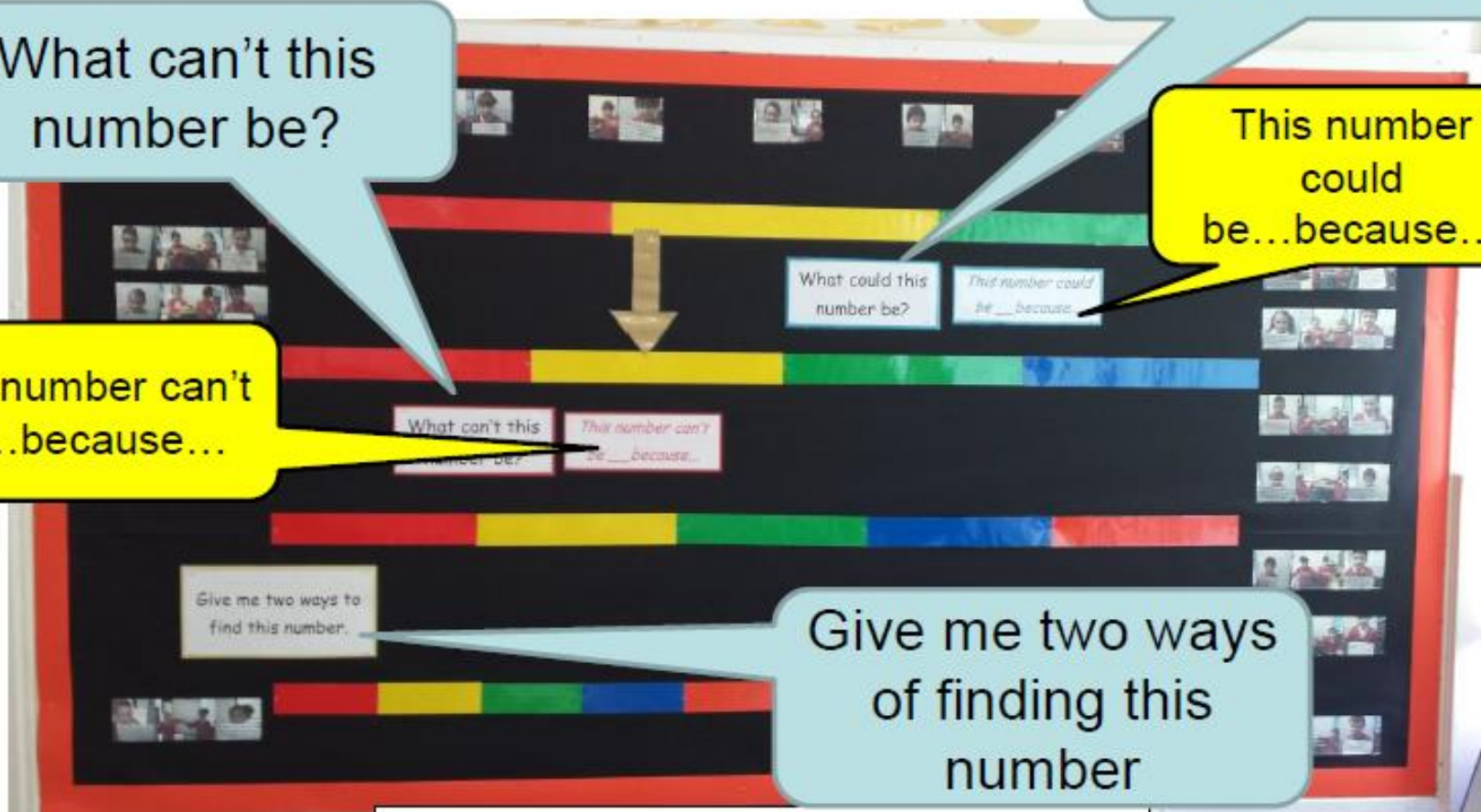
This number could be...because...

What can't this number be?

This number can't be...because...

Give me two ways to find this number.

Give me two ways of finding this number



Number Magnitude

It is important to develop linear estimation.



Activities like this help to develop strategies for estimating and children's sense of the relative size of numbers.

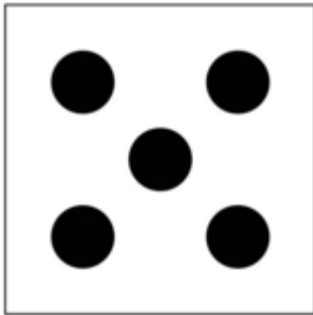
It is essential that children explain their reasoning.

Subitising

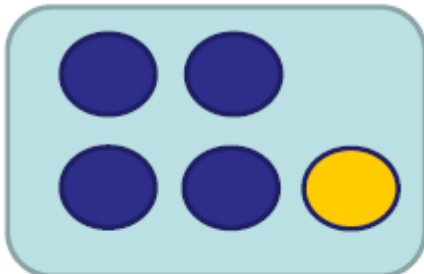
The process of immediately knowing how many objects are in a small group without needing to count them.



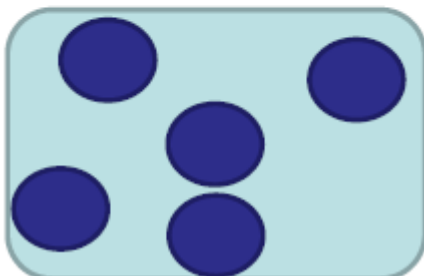
Developing early number sense



Familiar and structured dot patterns



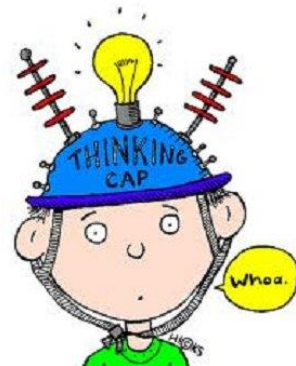
structured dot patterns



unstructured dot patterns



Dotzi



Perceptual Subitising



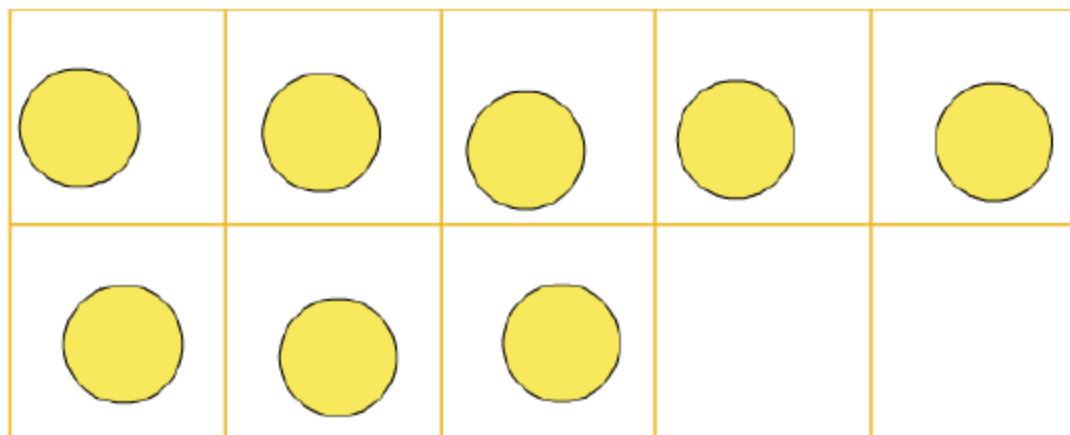
- Being able to 'just see' how many are in a group, without counting

→ Conceptual subitising

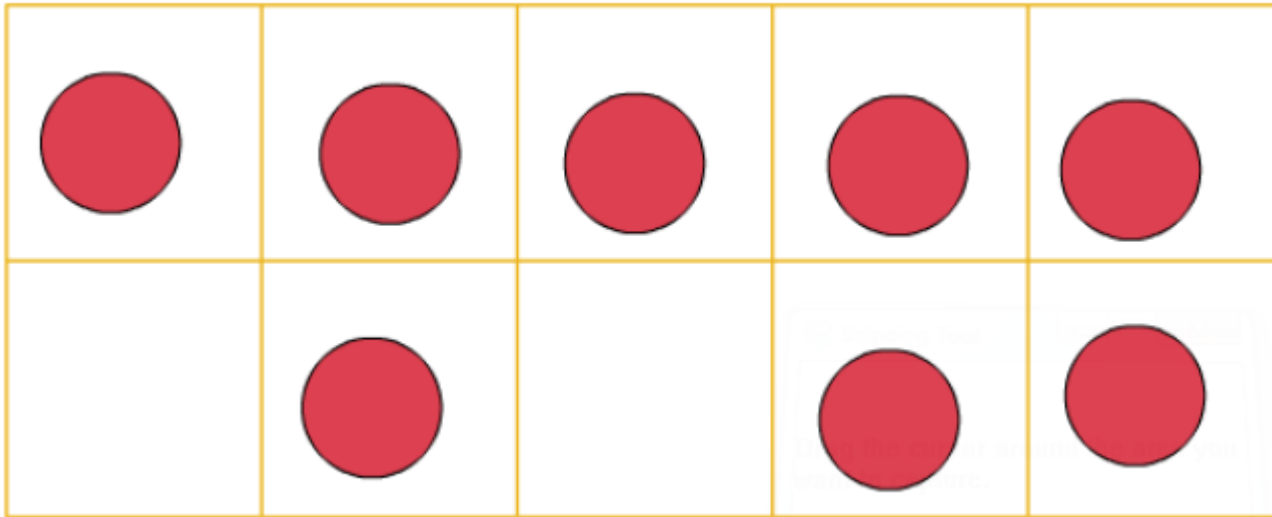
- Being able to see numbers within numbers (eg 6 is made of 4 and 2).
This helps to develop efficient calculating skills.

Partitioning/building numbers

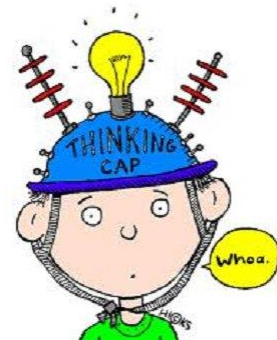
Say what you see...



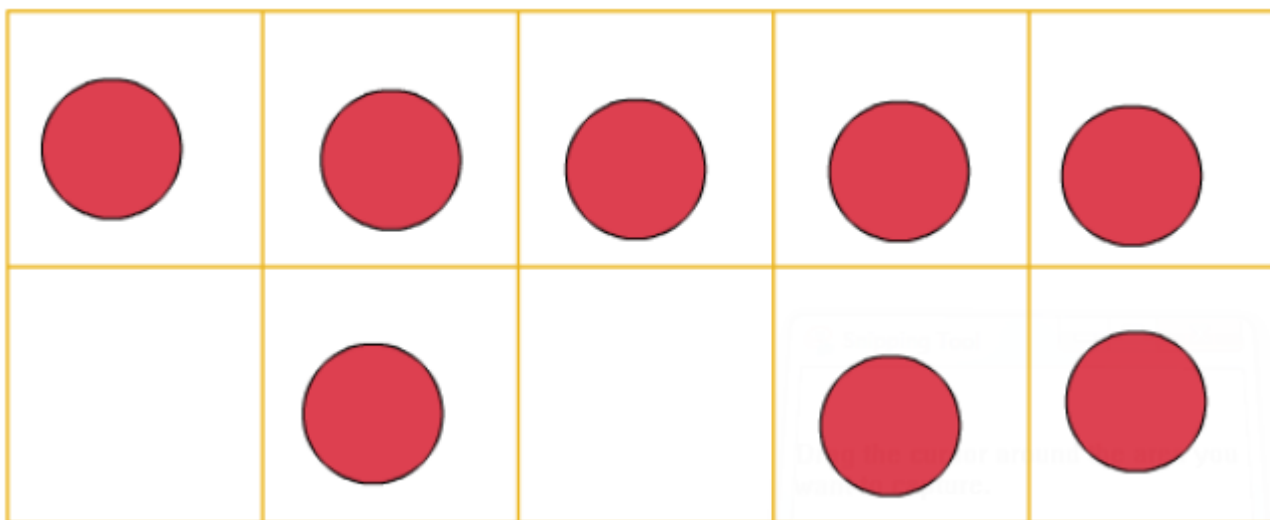
Partitioning/building numbers



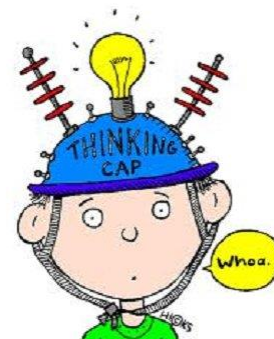
Build it!



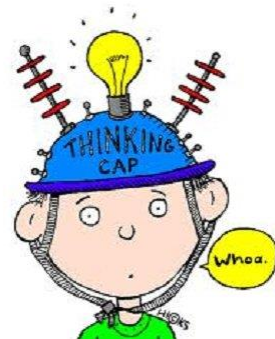
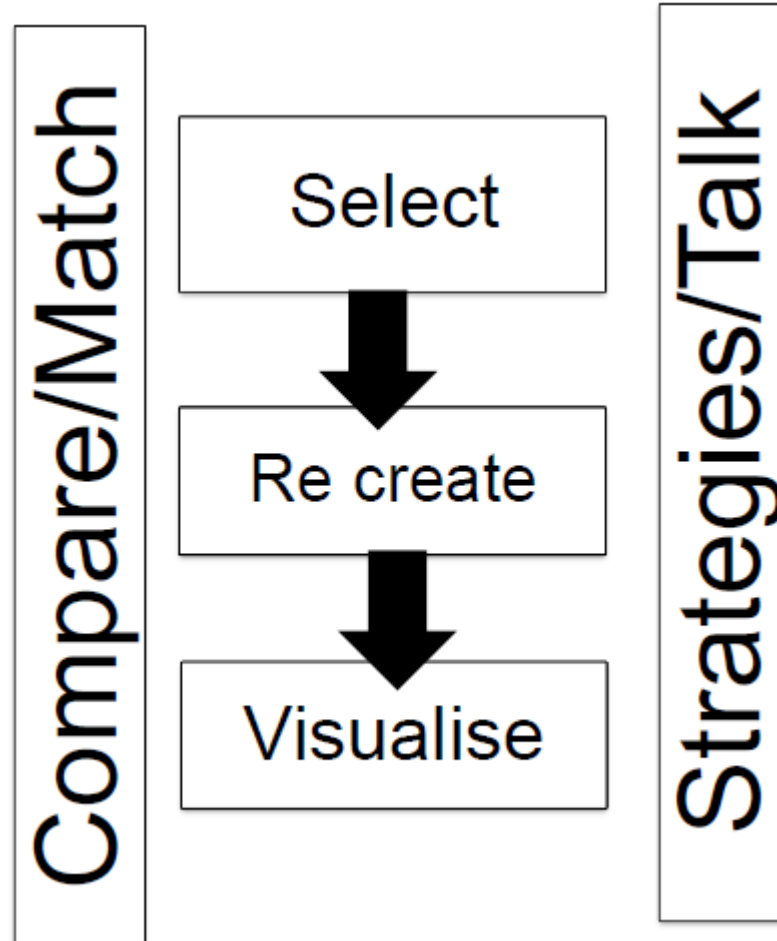
Partitioning/building numbers



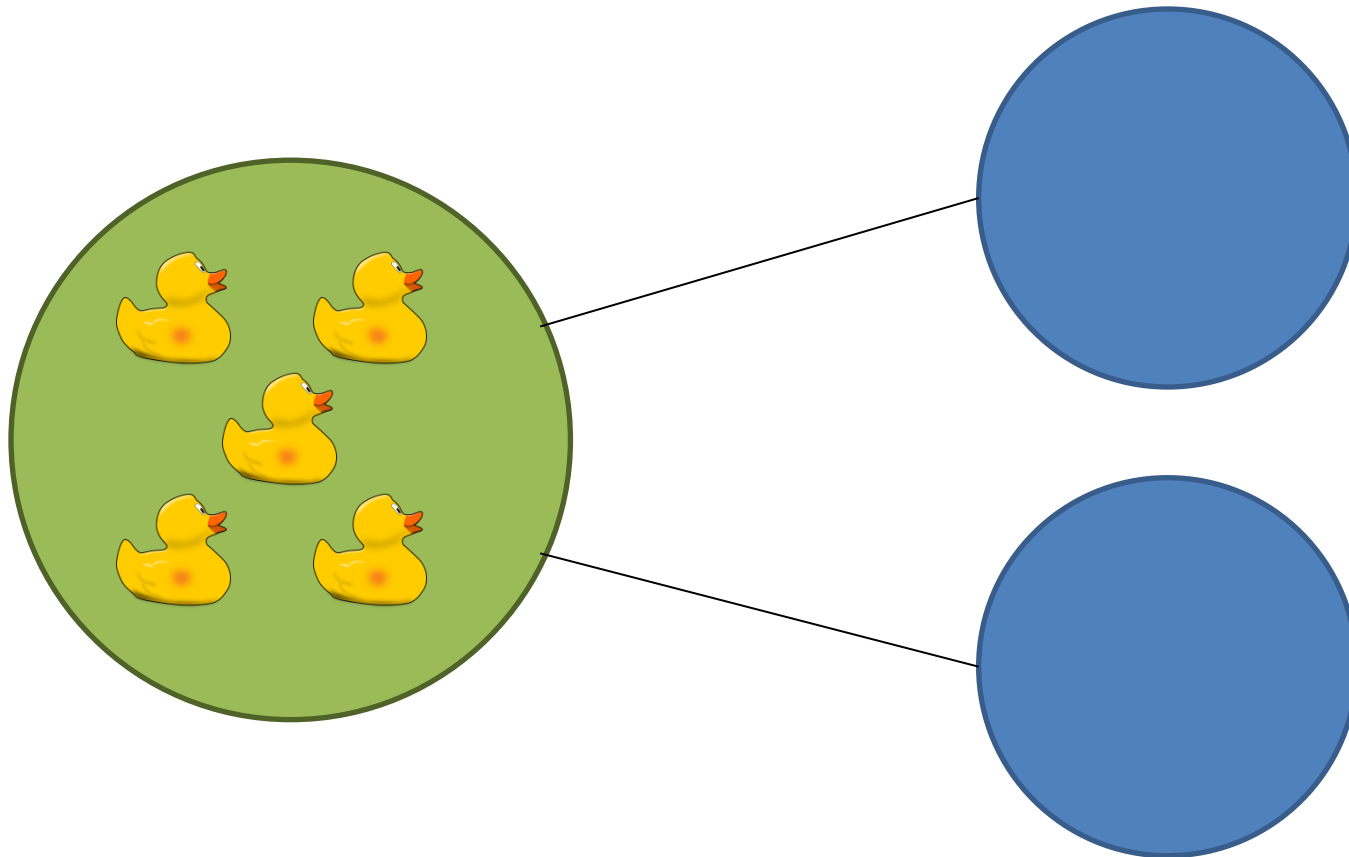
How did you do?

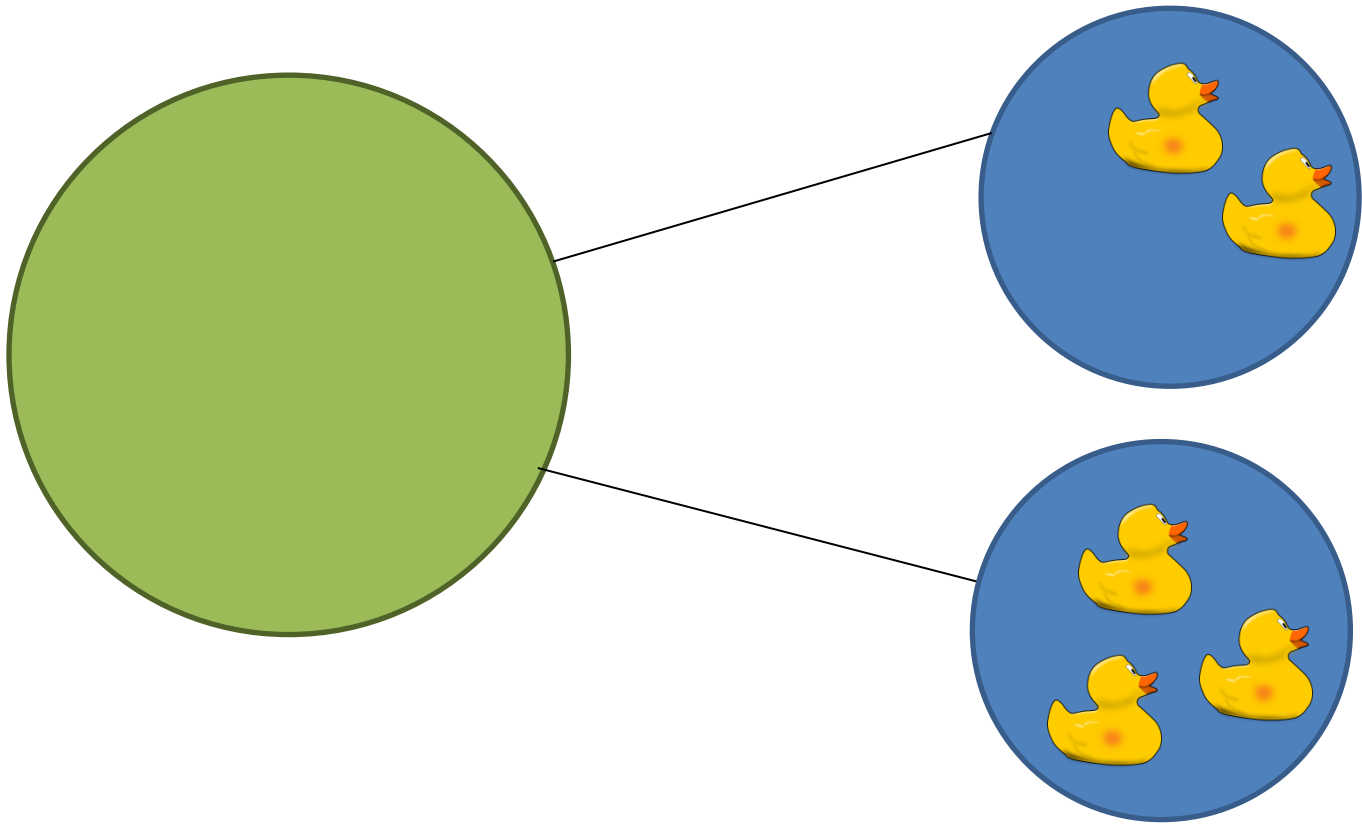


Steps to subitising

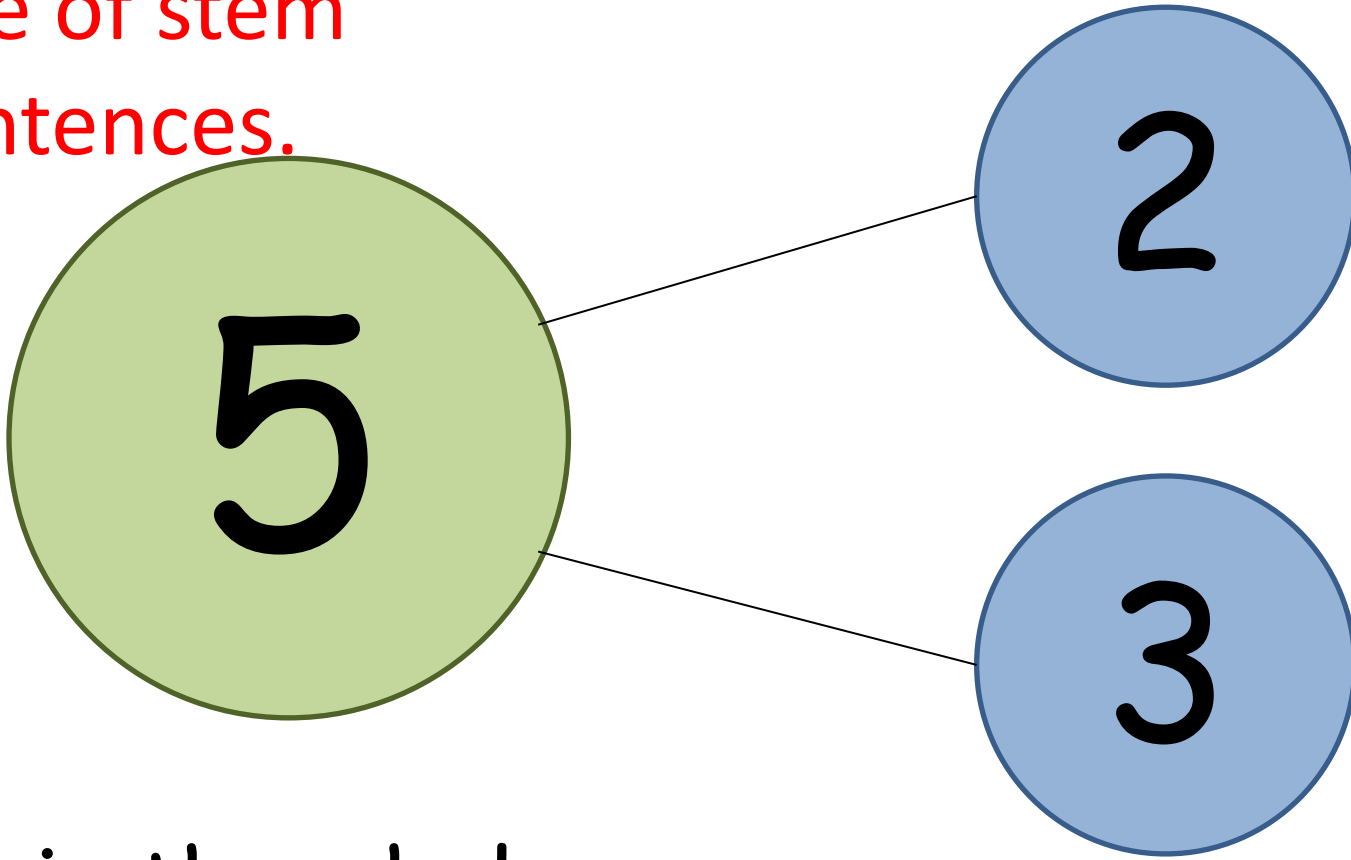


Developing Number Sense: The Part Part Whole Model





Use of stem
sentences.

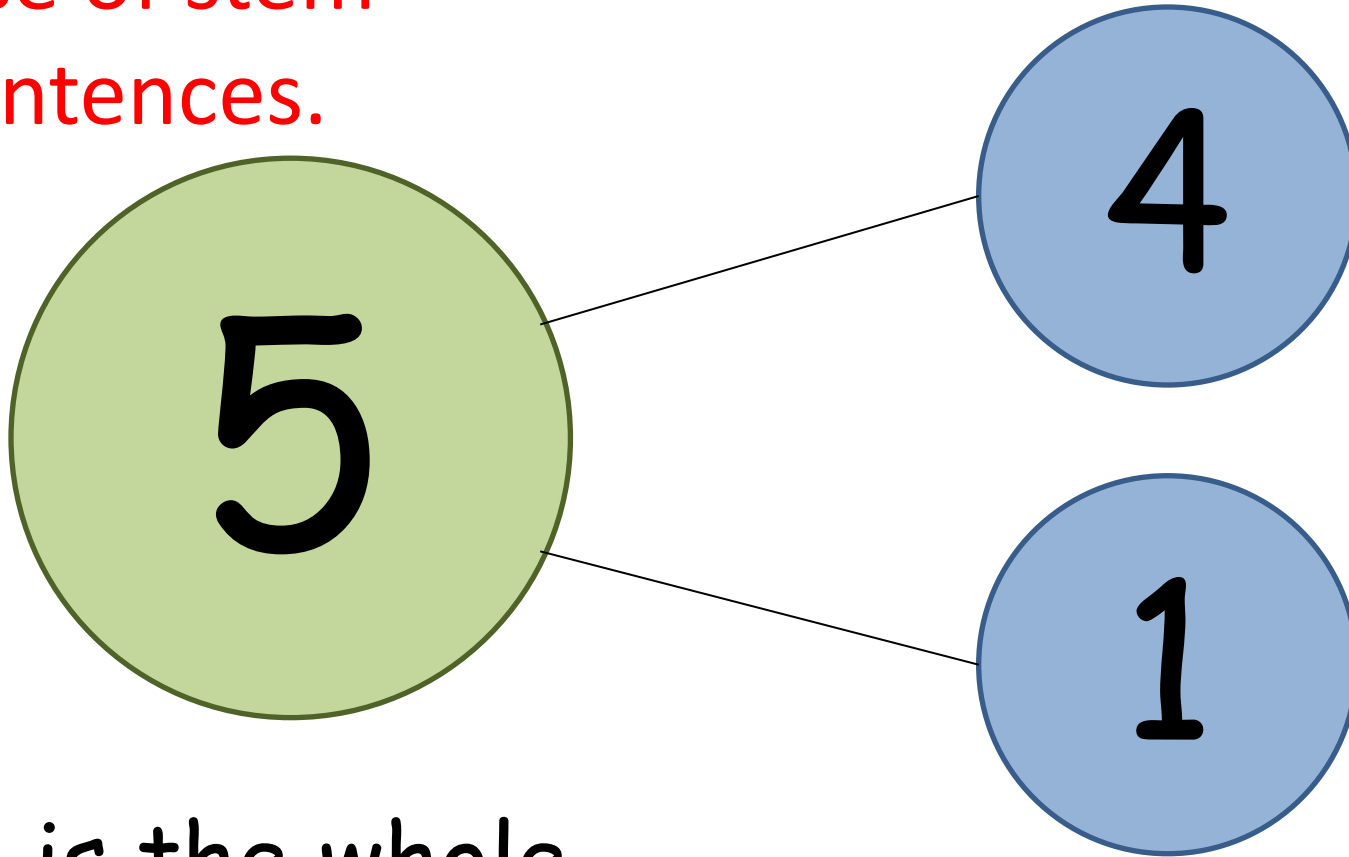


5 is the whole.

2 is a part.

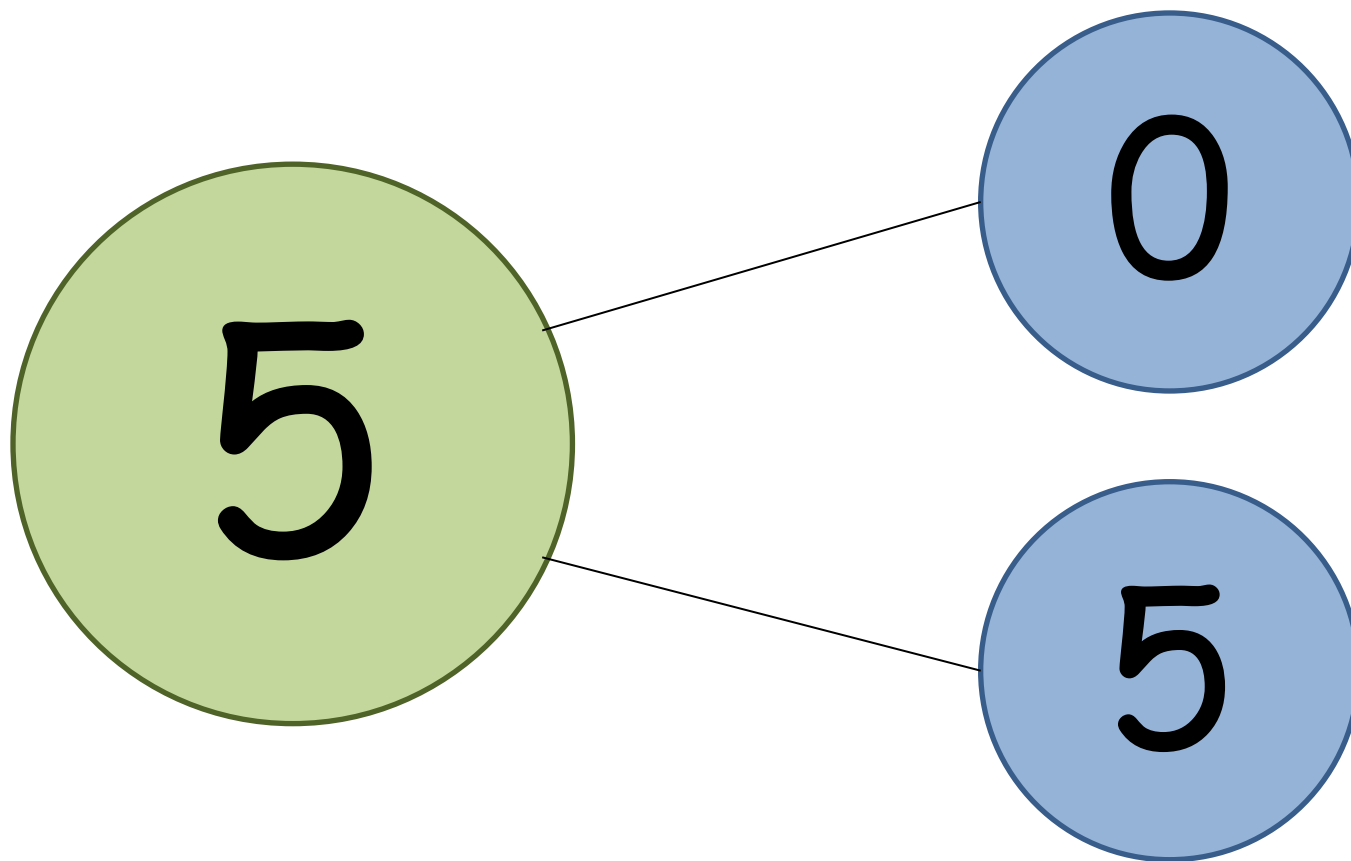
3 is a part.

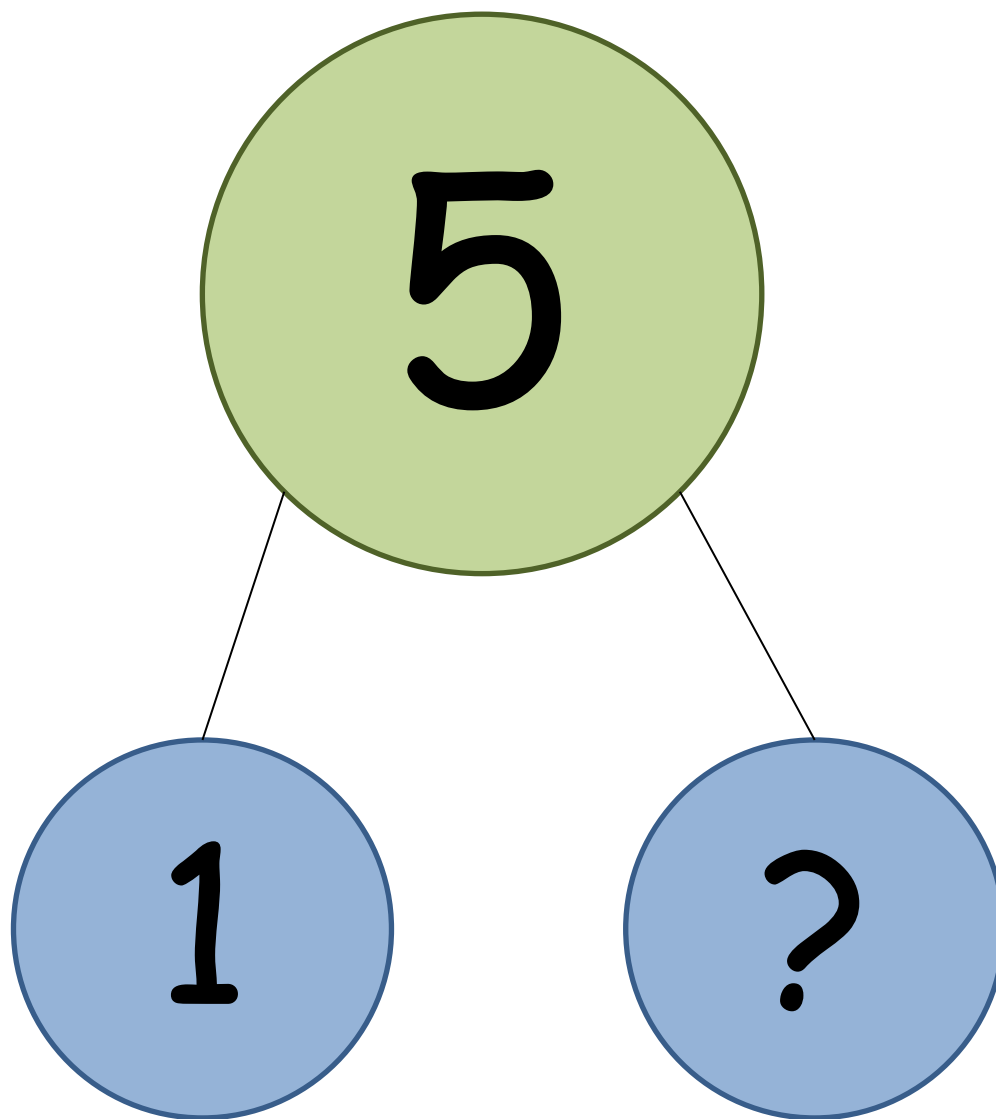
Use of stem
sentences.

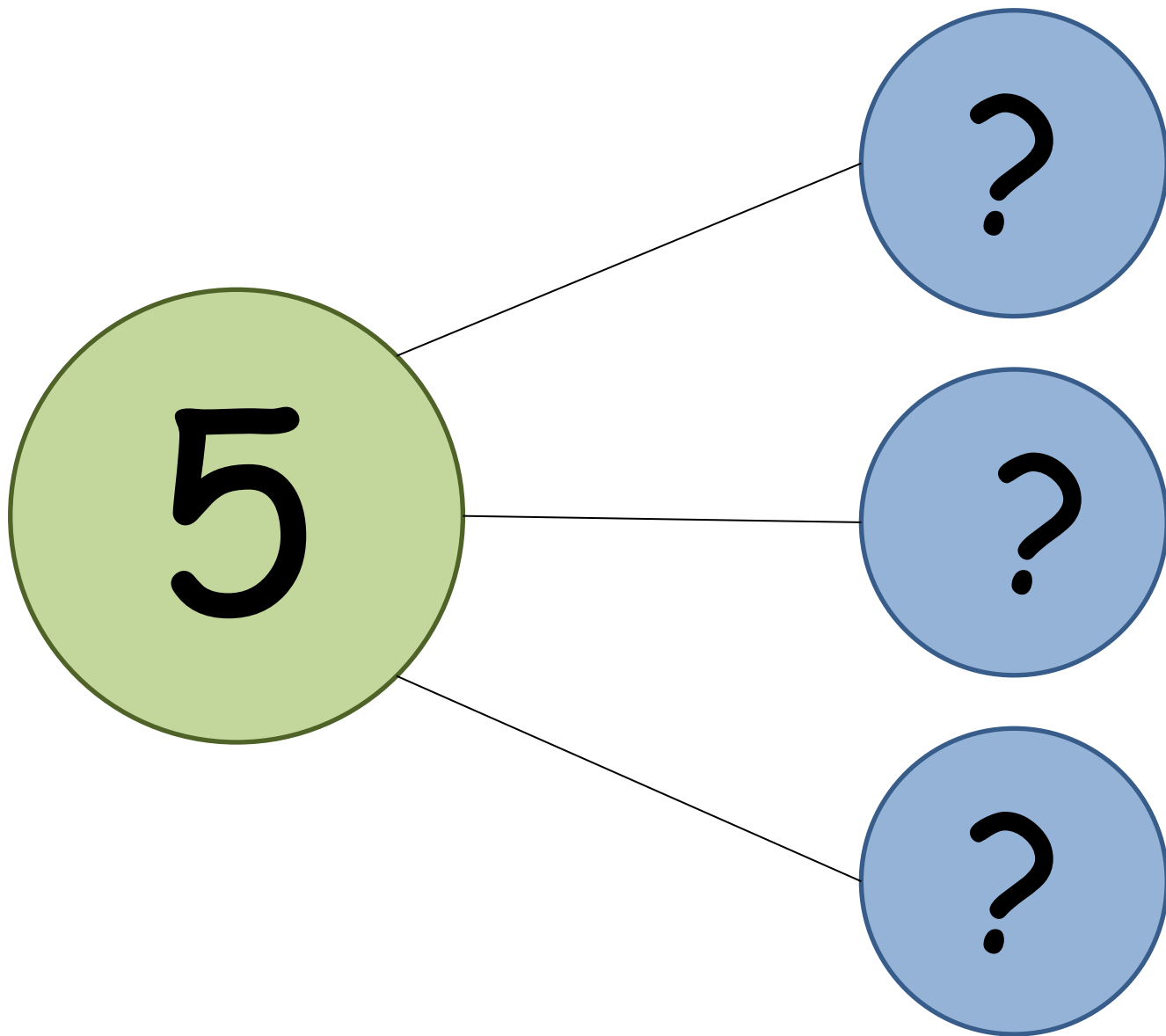


5 is the whole.
4 is a part.
1 is a part.

Also use zero.







Developing number sense and security

The story of 5

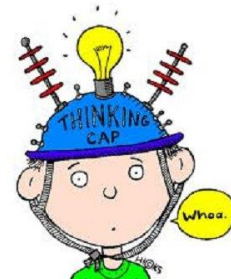


$0 + 5$

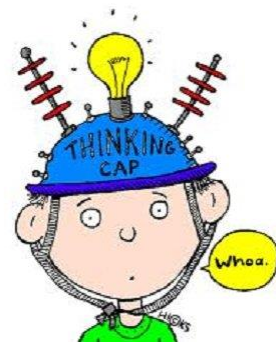
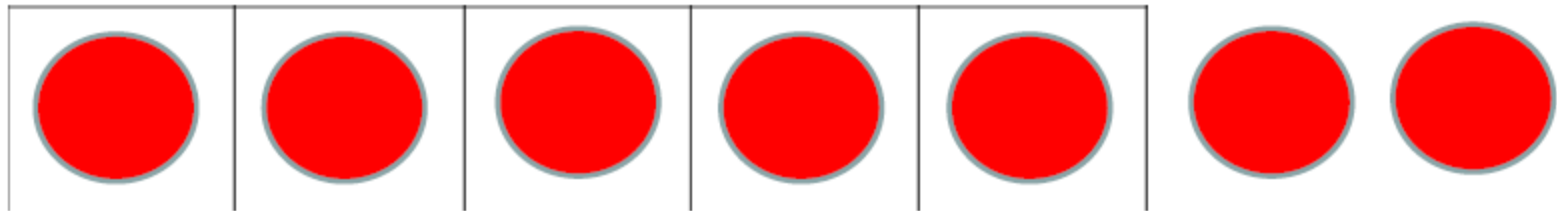


$1 + 4$

--	--	--	--	--



Securing numbers to 5





Invention of strategies



Elvis... 'I can't do $8 + 6$ so I saw $4 + 3$ and I doubled it. I'm good at doubling.'

Mari (Y1) ... when calculating $4 + 3$ 'It's like $2 + 2 + 2 + 1$ so that's 6 and 1 more and that makes 7'

= Number sense → fluency and confidence

Key Strategies for Number Sense

'Near Make 10'

I know $6 + 5 = 11$ because I know
that $5 + 5 = 10$

I know that $5 + 4 + 6 = 15$

Partitioning numbers to 'make
10' and some more

$$8 + 6 = 8 + 2 + 4$$
$$93 - 7 = 93 - 3 - 4 = 86$$

Friendly
10

'Make 10'

$$6 + 4$$

How could knowing
this fact help to
solve $60 + 40$ or 334
 $+ 206$ or $1.26 +$
 3.24 ?



Key Strategies for Number Sense

'Doubles'

$$6 + 6 = 12$$

How could knowing this fact help to solve $60 + 60$ or $0.6 + 0.6$?

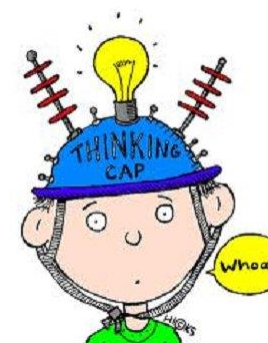
I know that $1.3 + 2.1 + 1.3$ is 4.7 because double 1.3 is $2.6 + 2.1$

'Near Doubles'

I know $6 + 5 = 11$ because I know that $6 + 6 = 12$

$$60 + 70 = 130$$

$$12 - 7 = 5$$





Guided Strategies to Secure

Make 5/10

Near make 5/10

Doubles

Near doubles

1 more 1 less (2 more 2 less)

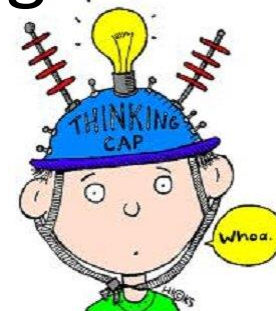
The zero effect

Switch it



How can you help at home?

- Involve your child in everyday maths.
- Help to develop your child's sense of number magnitude by talking about the size of numbers. Have a go at estimating.
- Play lots of games, including the ones we've provided and ordinary board games.
- Discuss and celebrate your child's strategies for calculating.



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’

