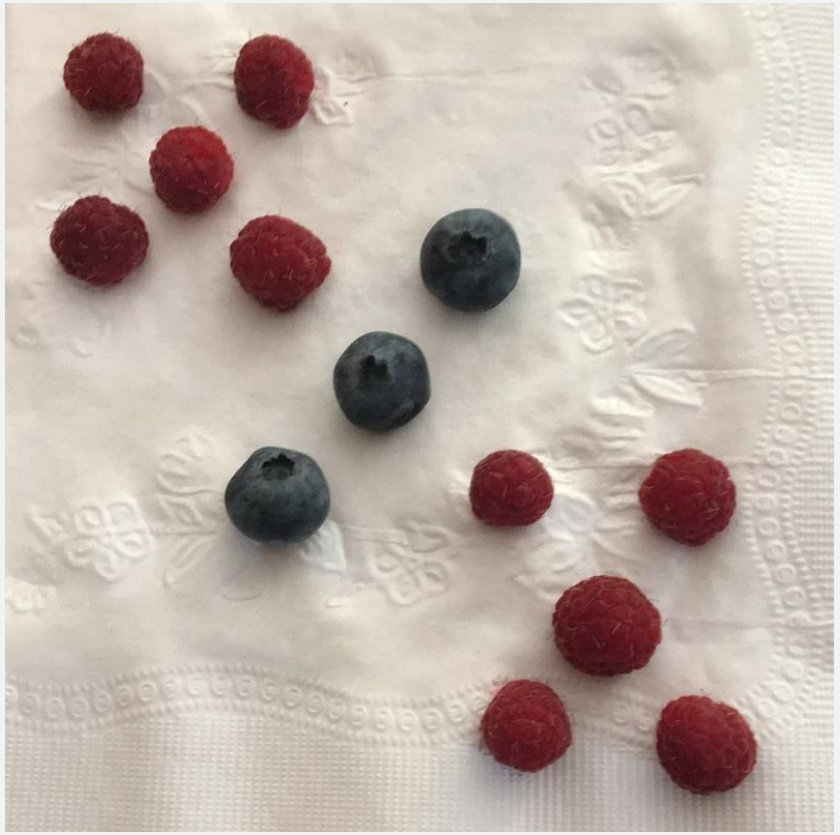
Additive Reasoning – the Key Concepts



Aims:

- To understand the importance of subitising and its links to composition of number and additive reasoning.
- To understand how to support children to understand different strategies to calculate efficiently.
- To understand how to support children in your setting to develop a deeper understanding of additive reasoning in EYFS or KS1

What is additive reasoning?

How is it the same as/different from addition and subtraction?

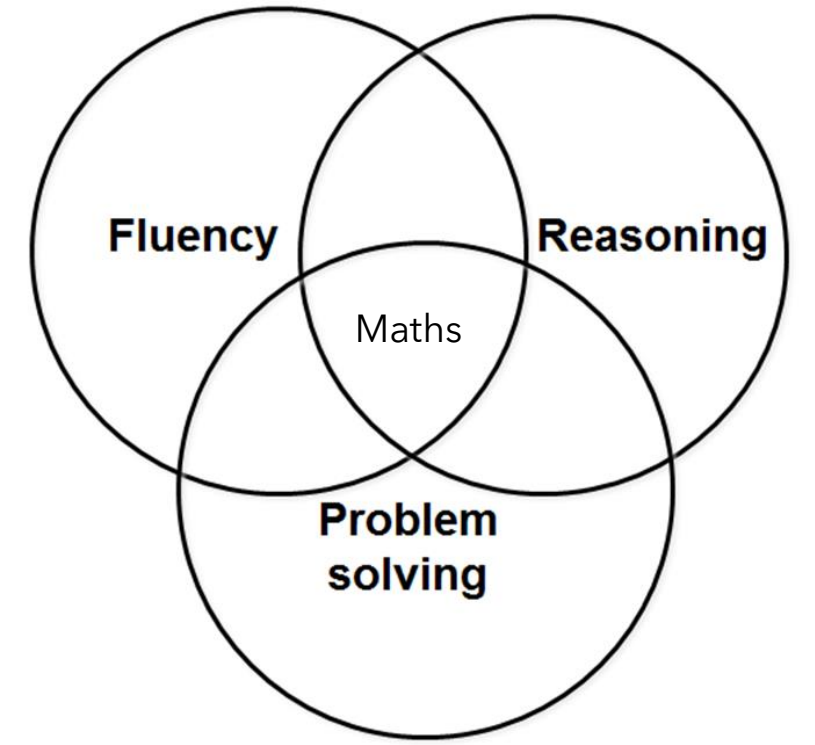
True or false?

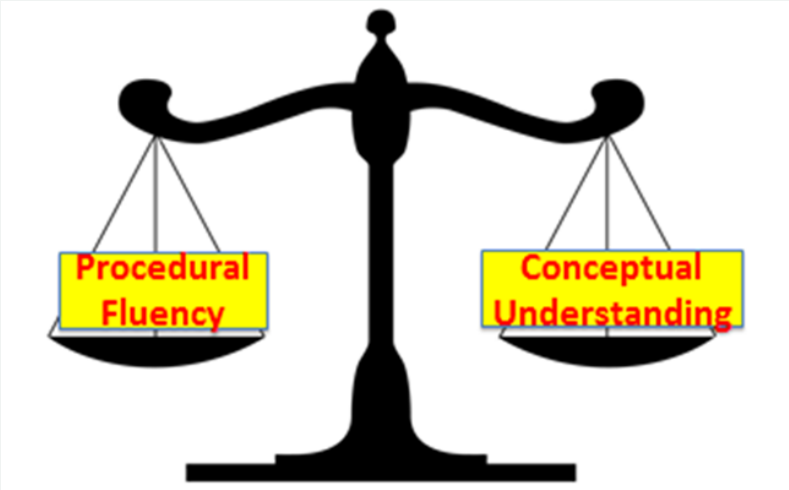
$9 + 4 = 10 + 3$

Additive reasoning vs addition & subtraction

- Work flexibly with the concepts of addition and subtraction
- Going beyond memorisation of basic arithmetic skills
- The means to communicate additive understanding effectively

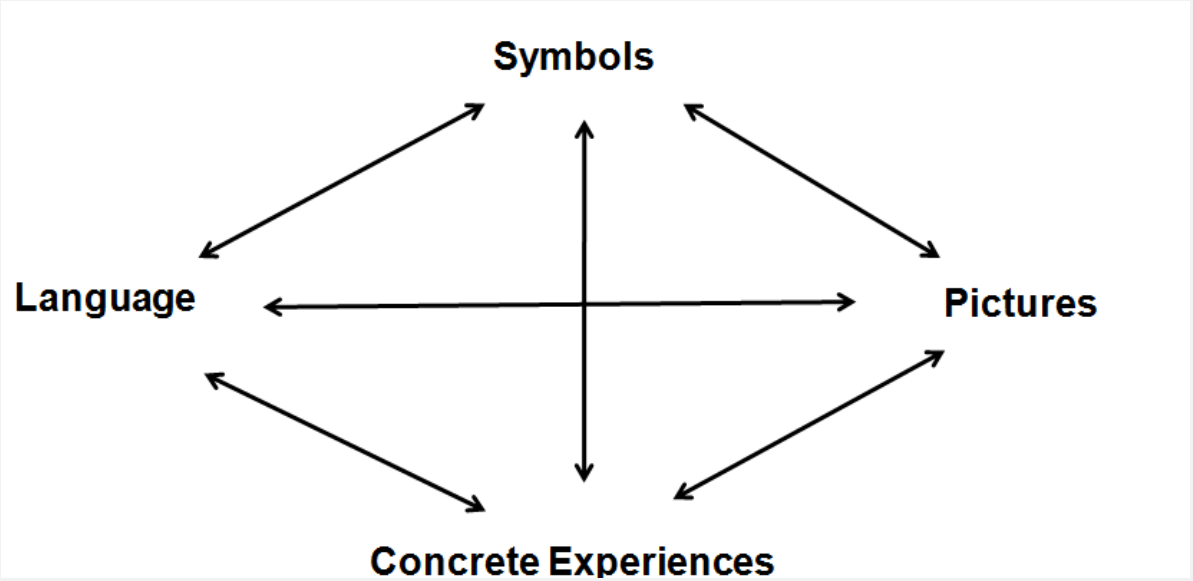
Aims of the National Curriculum





Connections model

(Haylock and Cockburn; 2008)



What do you think?

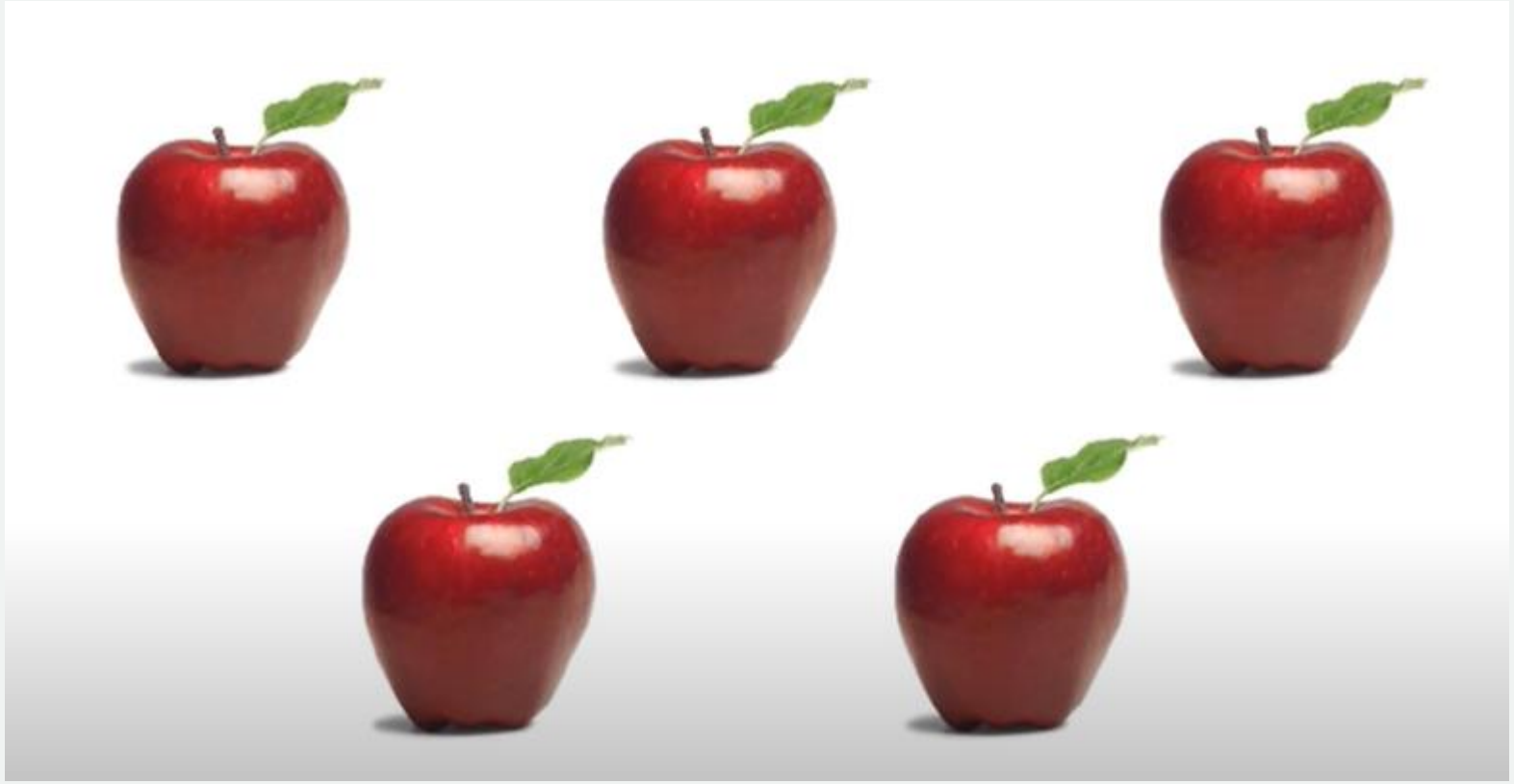
Young children are differently experienced and not differently able at mathematics

Gripton, C and Williams, H; The principles for appropriate pedagogy in early mathematics: Exploration, apprenticeship and sense-making. Part 1; ATM Journal 285; Feb. 2023

Instant recognition of small quantities:

Subitising (from a Latin word meaning suddenly) is a perceptual technique to determine quantity (but only for very small amounts). It is an intuitive / simultaneous awareness of exact quantity.

How many can you see?



(1) Subitizing 5 - YouTube

How did you 'know' these amounts?

Instant recognition of small quantities – this is called **perceptual subitising** and is thought that we can do this for up to 4 or 5 objects

For the larger amounts you probably used a sense of pattern / known facts – this is called **conceptual subitising**

Composition is…

‘Composition is the understanding that numbers can be made in different ways (using the operations of addition and subtraction)’

Griffiths, Back & Gifford (2016)

Conceptual subitising *is* an important case of composition of number

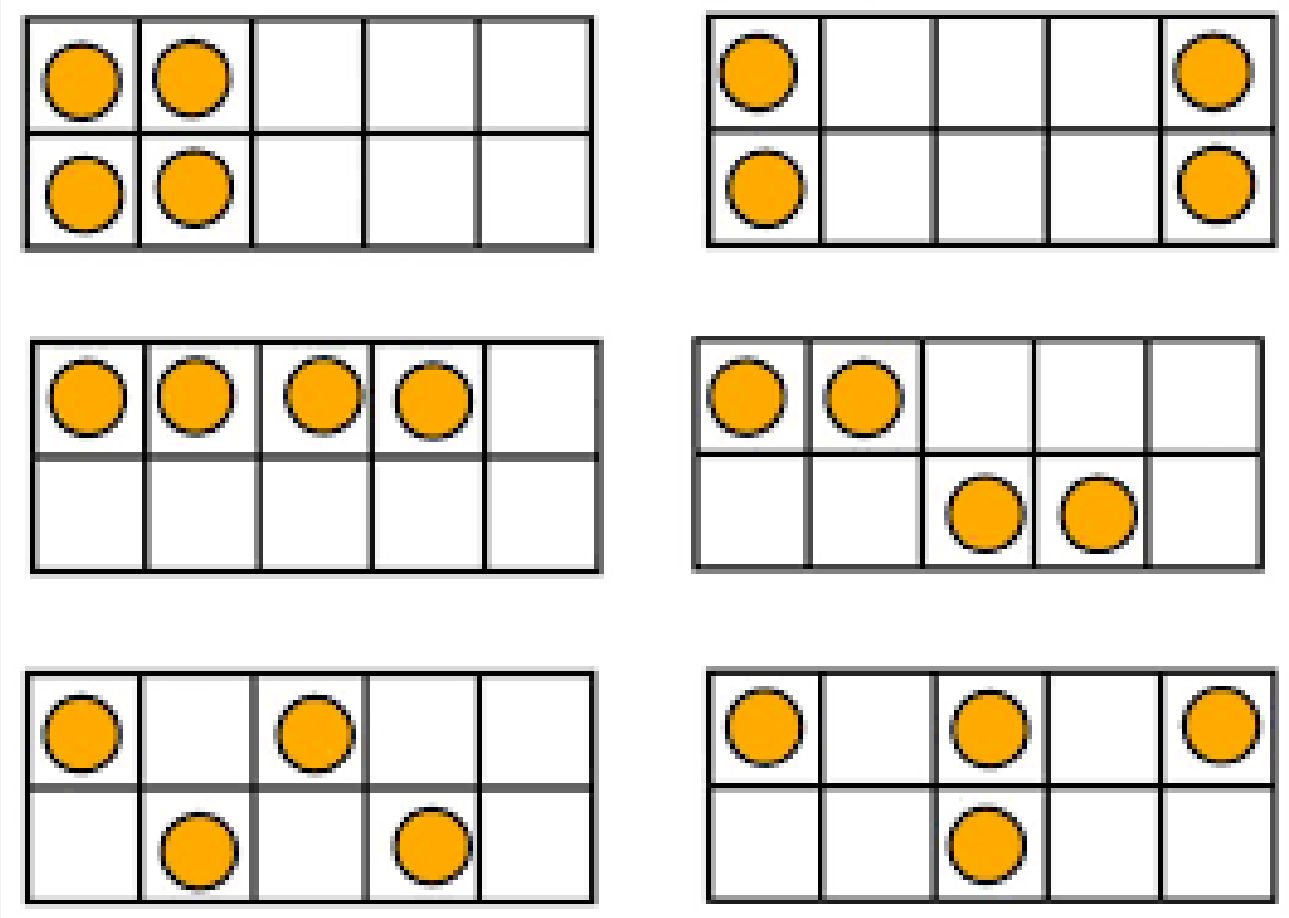
Clements & Sarama 2014

Subject knowledge - the link between subitising and composition

Conceptual subitisation - seeing sub-groups and knowing what the whole is

I can see four ducks… because I can see two and two and that makes four!

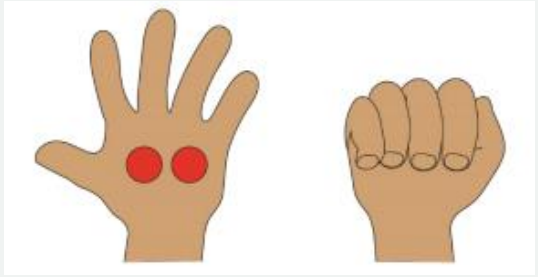
Subitising to five



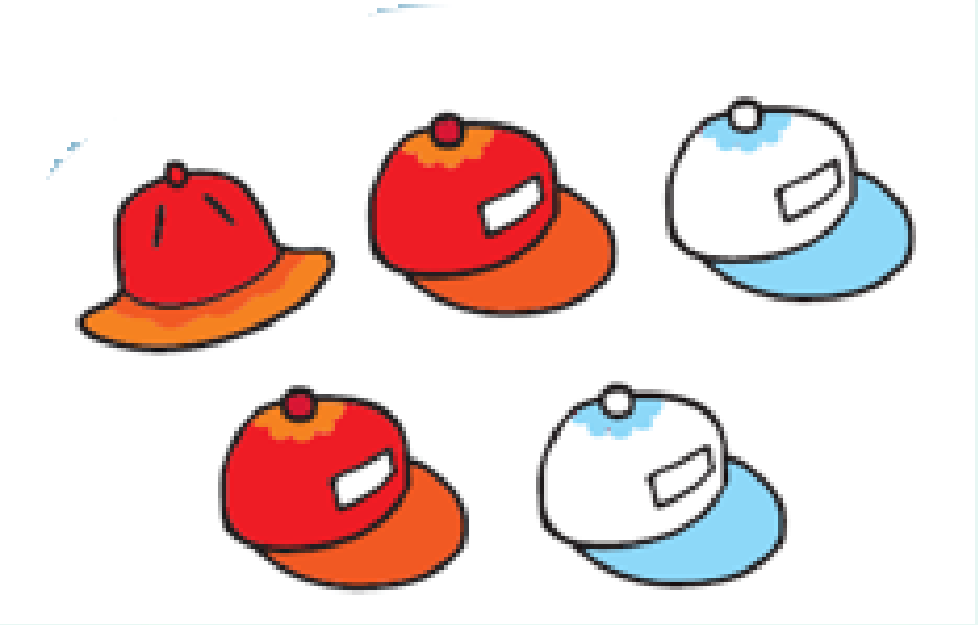
Composer to 4, then 5

Knows number combinations. Quickly names parts of any whole, or the whole given the parts

“I am holding 6 counters altogether. How many counters are there in my closed hand?”



What resources/key representations could we use to support their solving strategies?



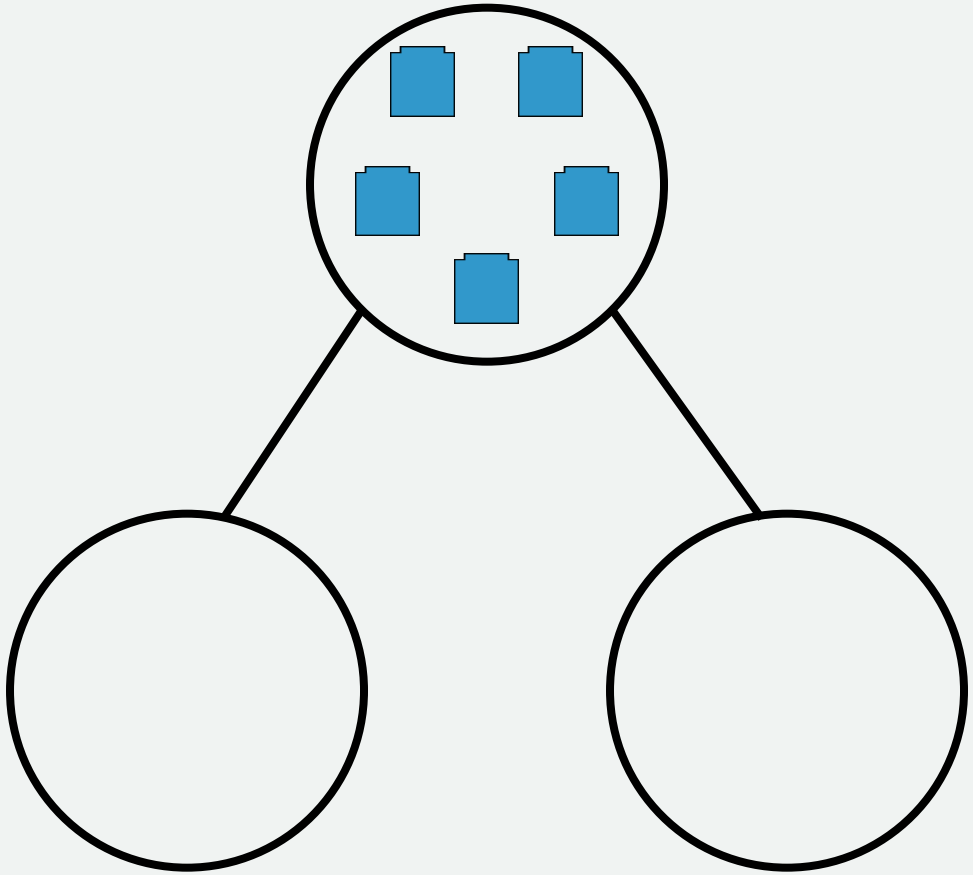
What do you notice about the size of the parts in relation to the whole?

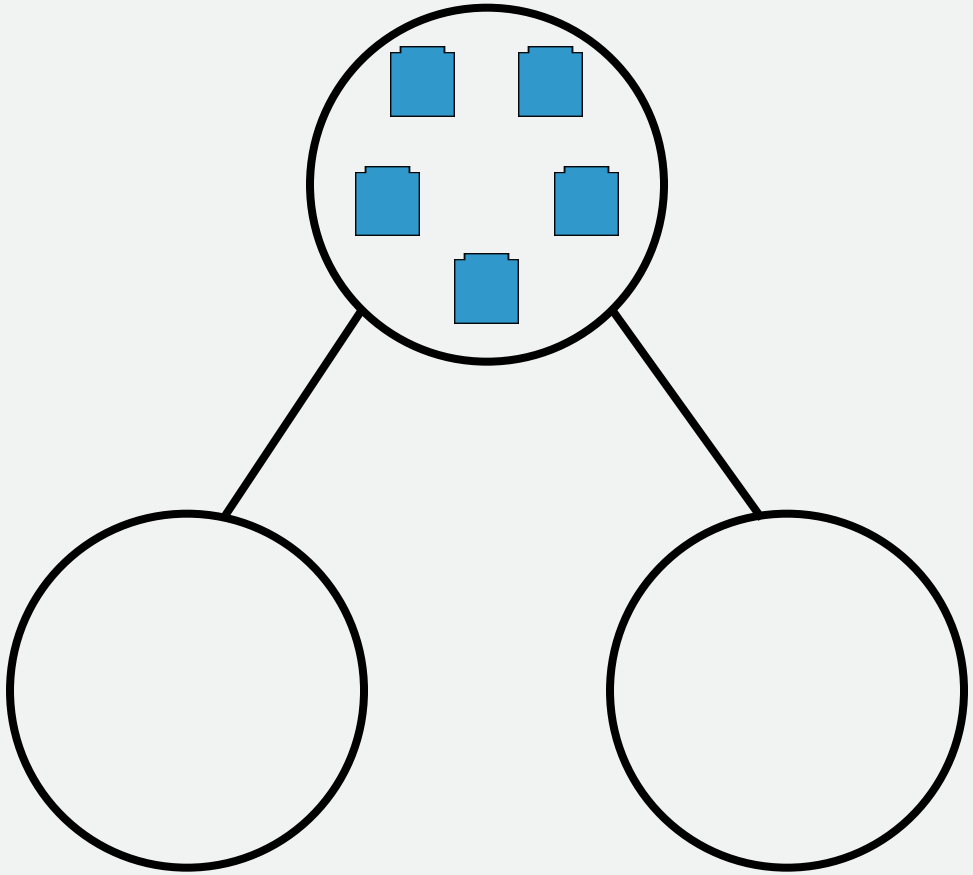
What happens when you put the parts together?

How many different ways can you split the whole into parts?

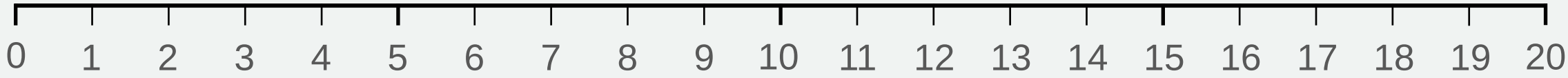
Splitting the Whole

Start with cubes/ counters.





Where are the numbers 11 to 19 on the number line? Are they before or after 10? Why?

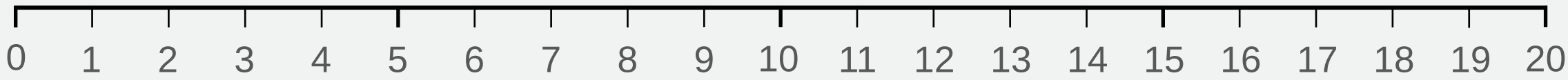


How will understanding that 14 can be composed of 10 and 4 help children explain *why* 14 is after 10?

Can you point to where 5 sits on the number line without needing to count from 0?

Can you place these numbers?

4 10 11 5 6 9

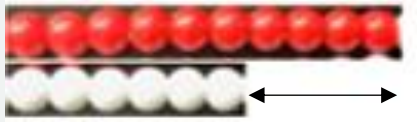


Why have these numbers been chosen?

2AS–1 Add and subtract across 10.	2AS–2 Recognise the subtraction structure of 'difference' and answer questions of the form, "How many more…?".

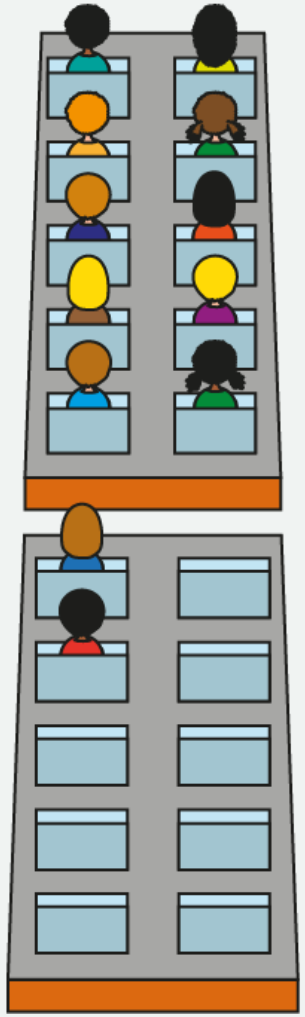
Mental calculation strategies

Explicitly teaching mental calculation strategies for addition and subtraction

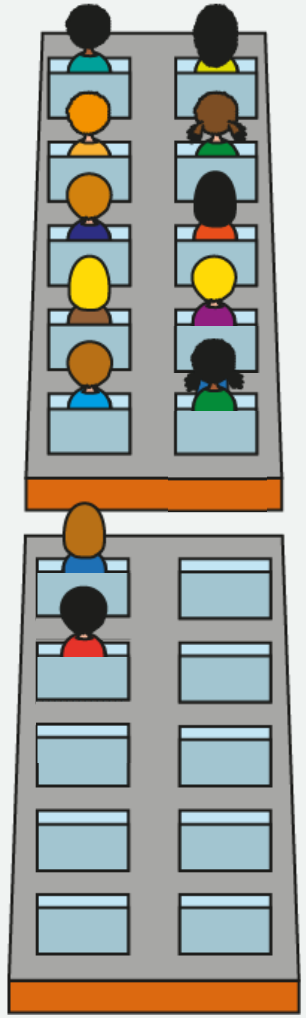
Doubles: 8 + 8 = 16 	Bridging: 7 + 5 = 12 
Near doubles: 6 + 7 = 13 	Adjusting: 16 + 9 = 25 
Number bonds: 7 + 3 = 10 	Finding the difference: 10 – 6 = 4 
Partitioning: 14 + 12 = 26 	Reordering: 8 + 7 + 2 = 17 8 + 2 = 10 …then… 10 + 7 = 17

Bridging Across Ten

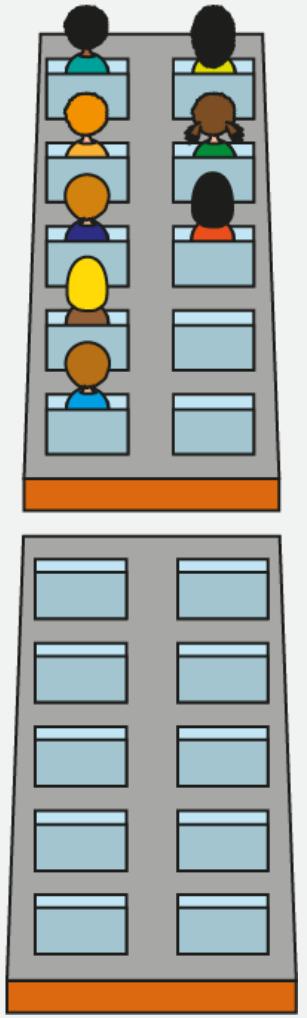
First



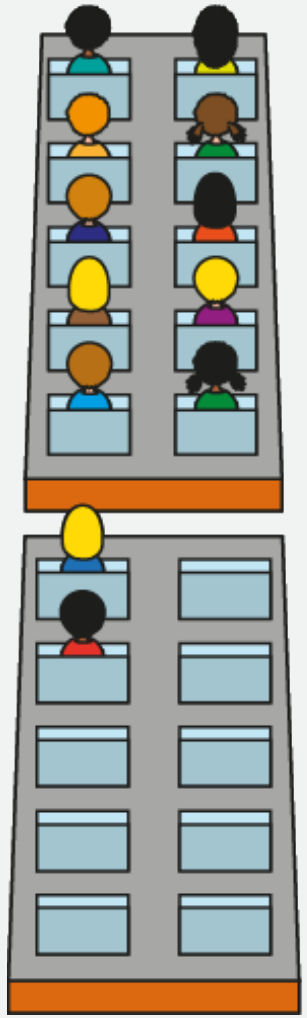
Then



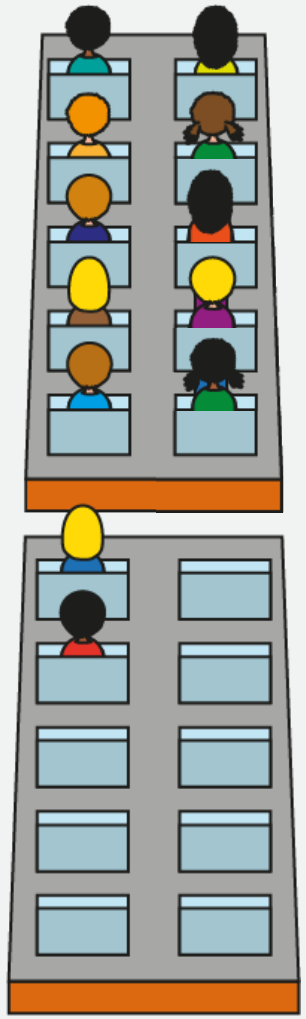
Now



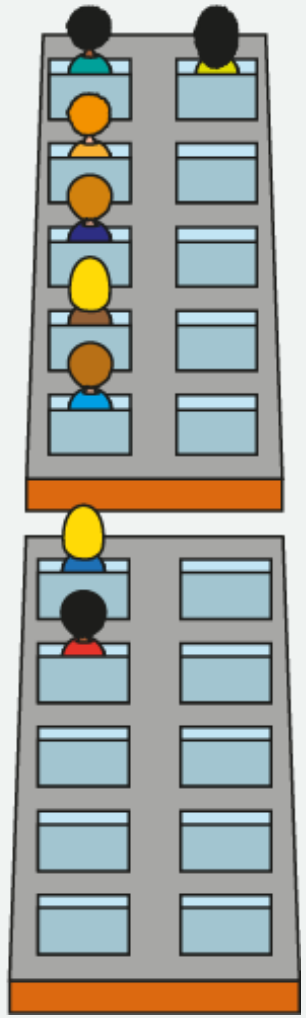
First



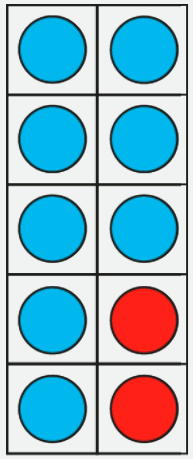
Then

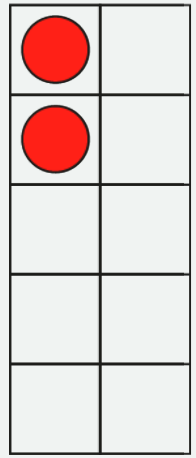


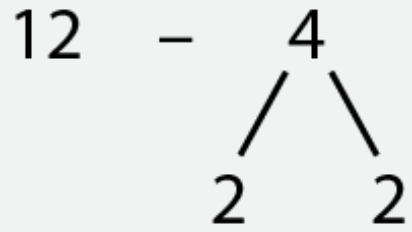
Now



$$12 - 4 = 8$$



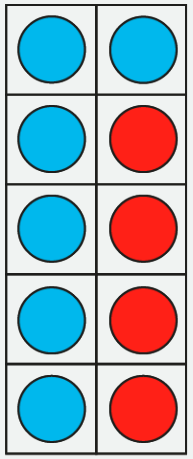


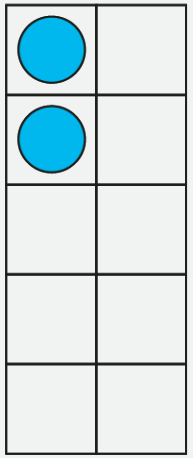


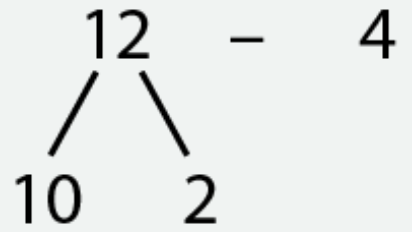
$12 - 2 = 10$

$10 - 2 = 8$

$12 - 4 = 8$







$10 - 4 = 6$

$6 + 2 = 8$

$12 - 4 = 8$

Now lets try 15 – 9

150 – 90

$$1.5 - 0.9$$

Key Take Aways

Joe Burbank Maths

X formally known as Twitter:
@joebur2009

E-mail:
joeburbankmathsconsulting@gmail.com

Website: www.joeburbankmaths.com