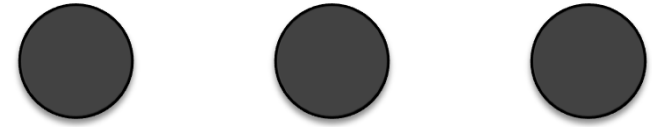
* Helping children to connect counting with the construction of base ten ideas.

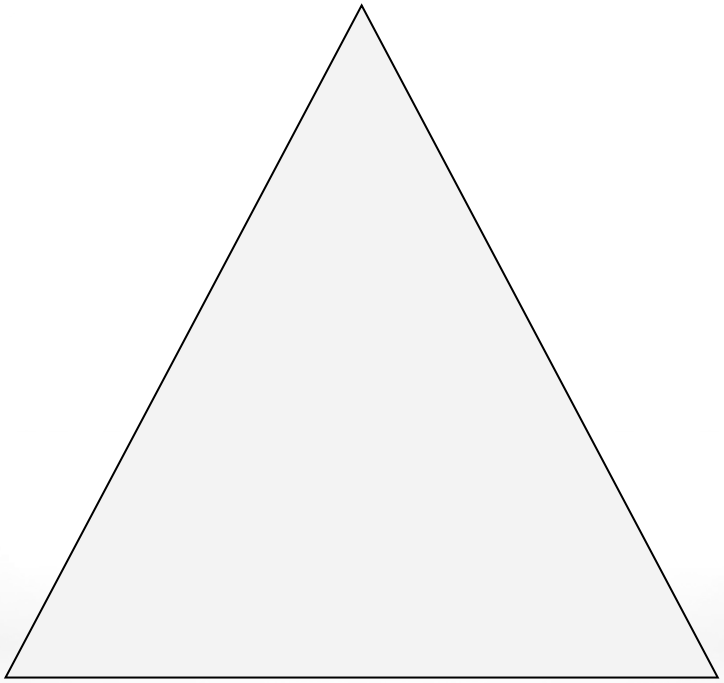
Outcomes for this workshop

Teachers will recognise

- That counting plays a key role in constructing base ten ideas about quantity
- The importance of connecting quantities to symbols and oral names for numbers.
- Teaching strategies for enhancing children's understandings.

Interpreting quantity





three

Number word

3

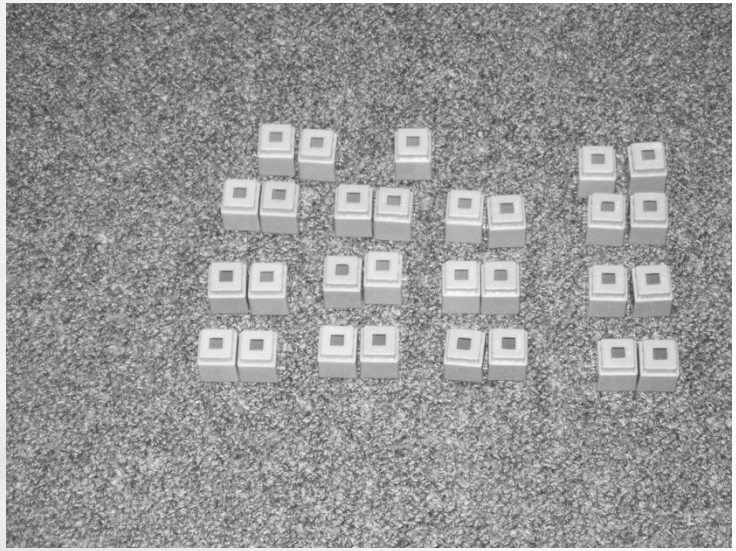
Symbol

Because children come to their development of base ten concepts with a count by ones idea of number, we must begin there. We cannot impose grouping by ten on children.

Van de Walle, 2006

Helping children construct understanding of the grouping by tens concept from what they know about counting by ones is our foremost objective

Provide children with lots of experiences with counting quantities between 20 and 200 and providing **proof** for the total that convinces others.

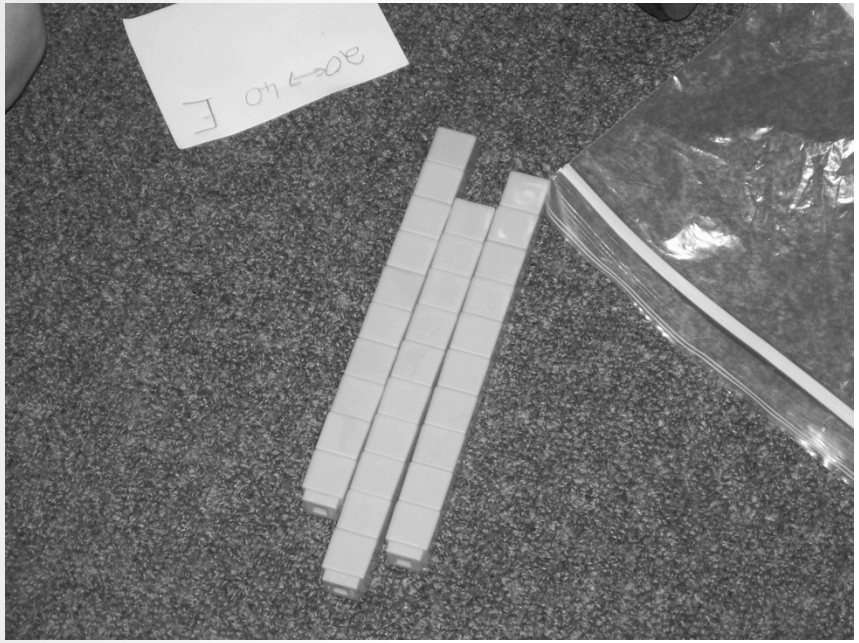


How many blocks?

It’s important for children to have a mess to count. They need to make sense of mess.

Such experiences assist children to

1. Notice that numbers represent quantities
2. Develop fast ways of checking totals



The idea of grouping to check and prove totals leads children to notice the power of strategically partitioning or structuring quantities into sub groups.

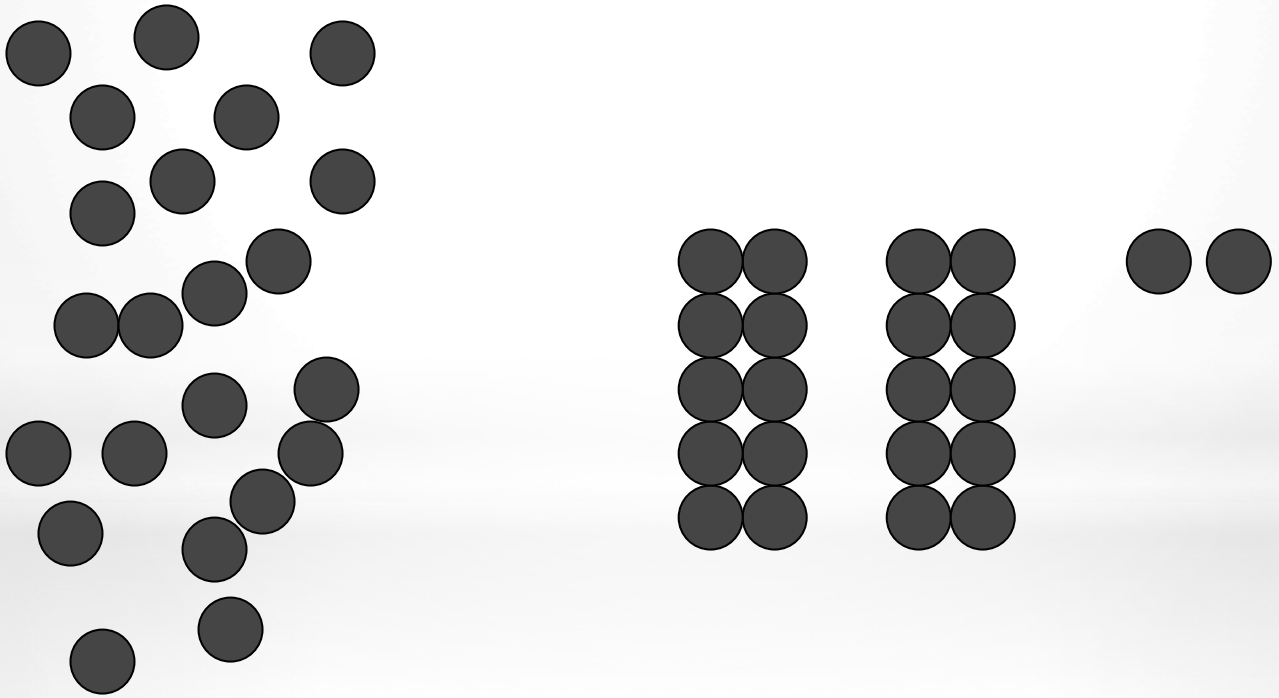
When children are counting quantities or working with quantities, ask questions such as

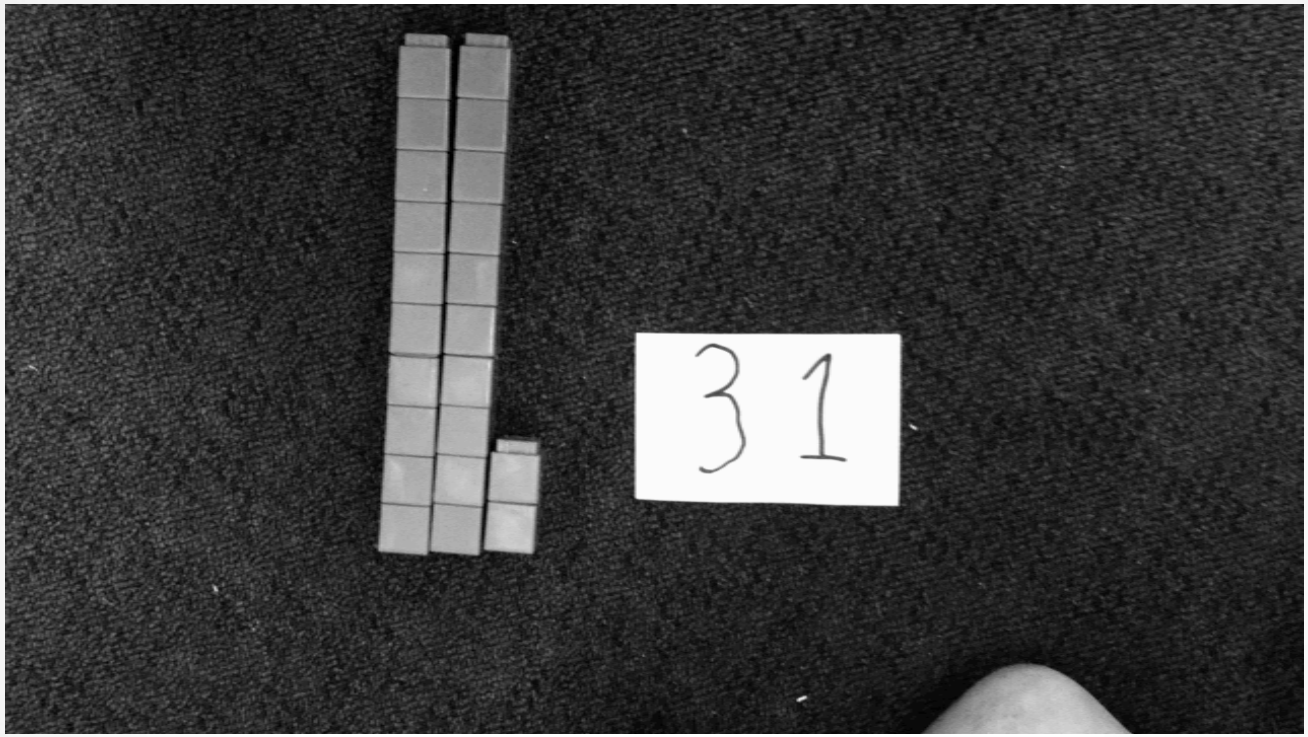
What is one more? What is one less? What is 10 more, What is 10 less?, What is 100 more? What is 100 less?, What is 1000 more, What is 1000 less? What is 1/10 more? What is 1/10 less?

*The one minute counting challenge

Children in the first three grades need to experience counting piles of objects and talking about the results.

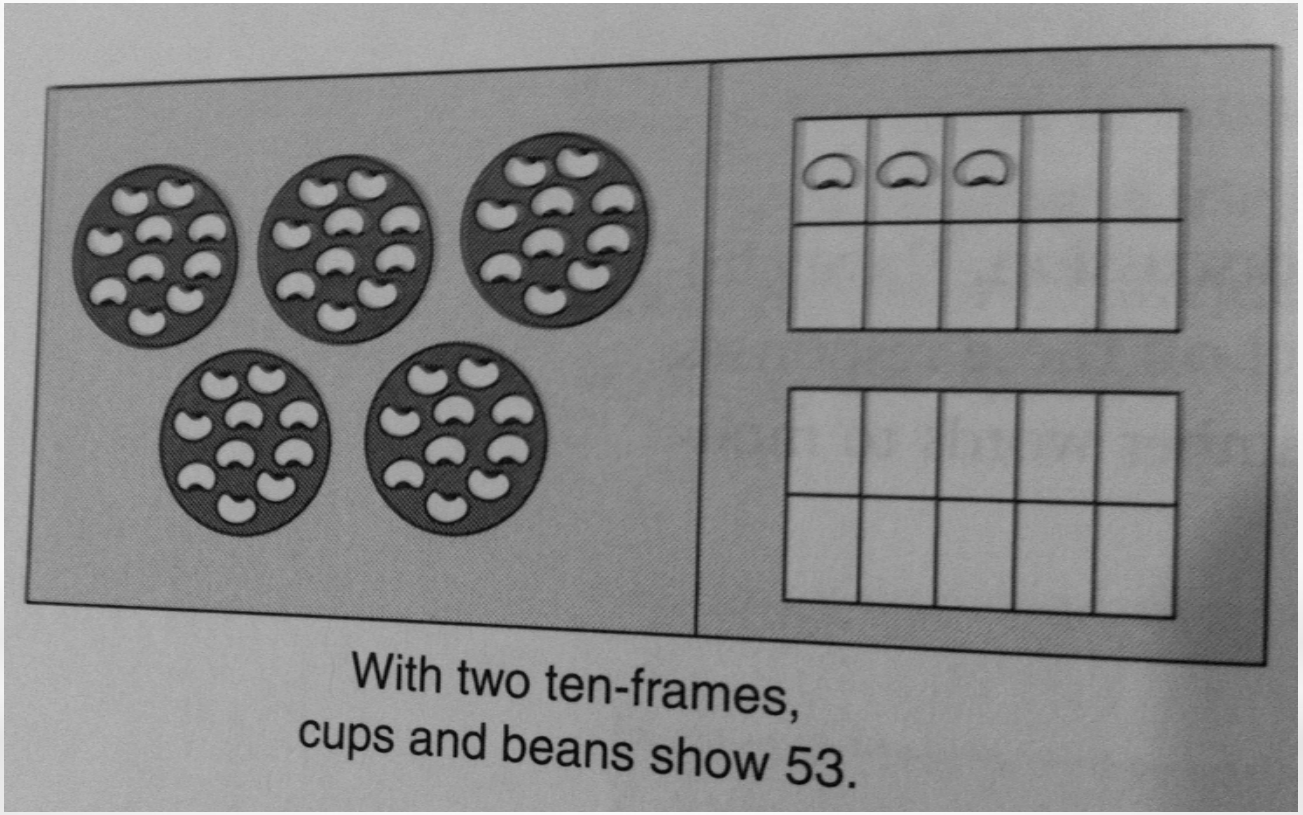
Each pile has the same number of buttons. Decide how many are in each pile.





*Integration of base ten groupings with count by ones

How can we be certain that there are 53 beans here?



With two ten-frames,
cups and beans show 53.

What do you think we'll get if we count by ones?

Children need to come to understand that an unknown quantity can be organised into a form that can be interpreted by inspection.

The process of grouping by tens is the framework for place value.

Physical models for base ten concepts can play a key role in helping children develop the idea of ‘ten’ a single entity and as a set of ten units. Remember though, the models do not show the concept to children. The children must construct the concept and impose it on the models.

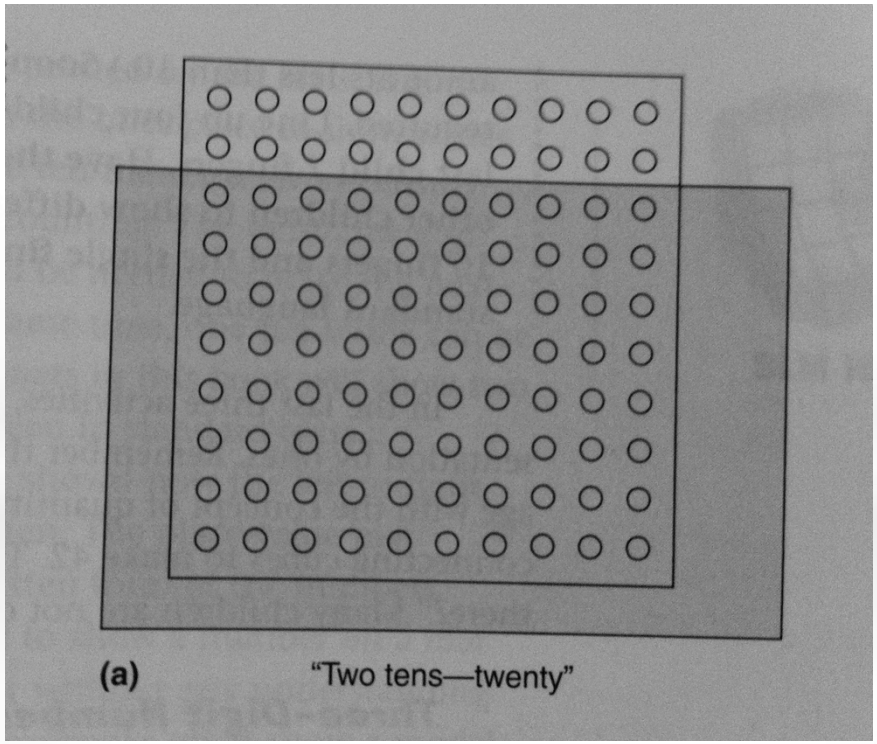
Van de Walle, 2006

Build to 111

Using unifix cubes, each player in turn rolls a die and collects unifix cubes. When they have ten unifix cubes they start again and keep building. The winner is first to 111.

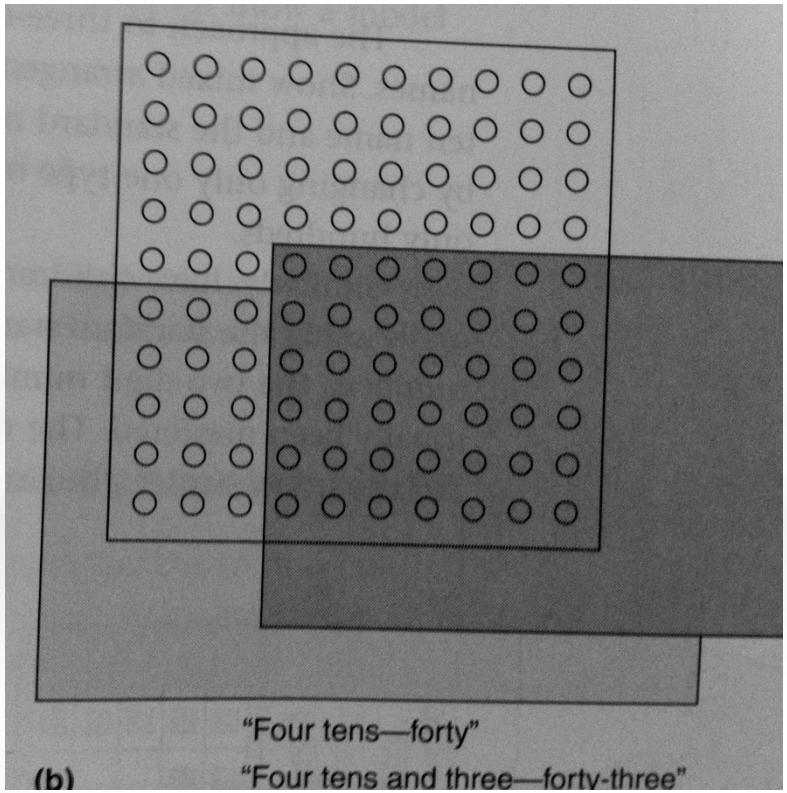
Counting rows of ten

How many tens?
Two tens is called twenty



Counting with base ten models

How many tens?
What's ten less?
What's one more?



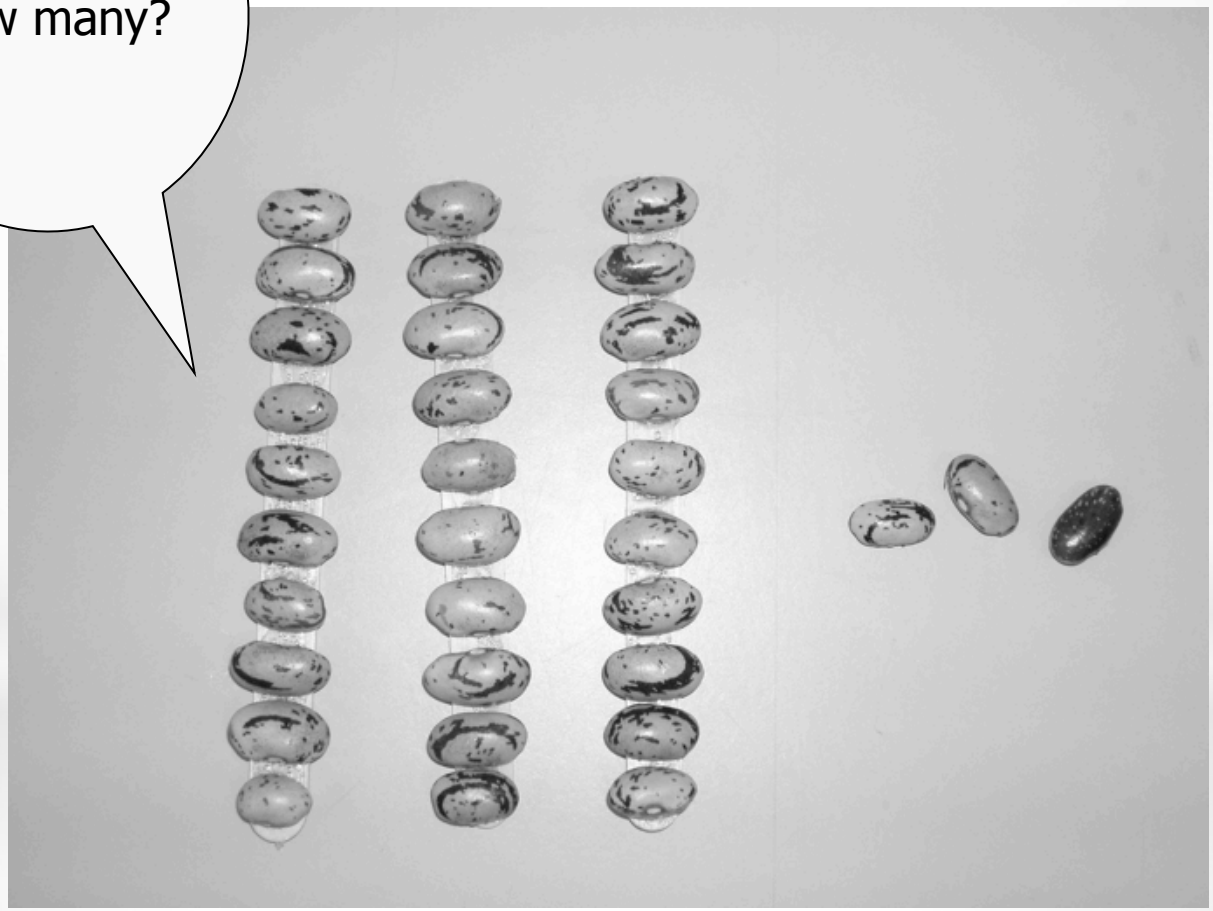
Bundling with icy pole sticks

Make sure students have many opportunities to construct their own bundles of ten!

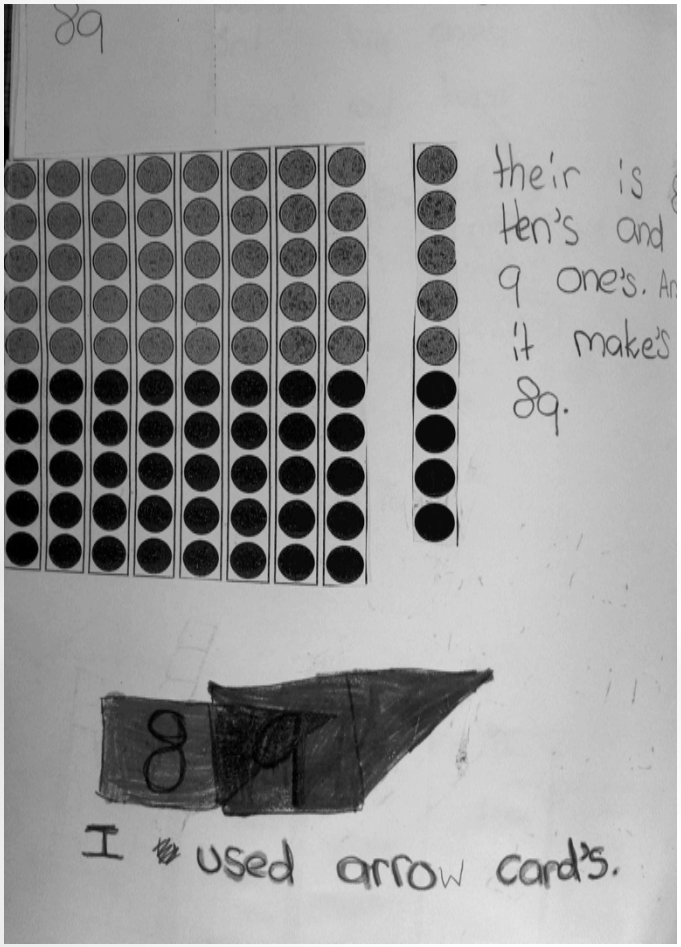
Your job at the factory is to bundle up sweets and send them to the shops. Each bundle has exactly ten sweets in it. At the end of the day you have to write down how many sweets you have packed.

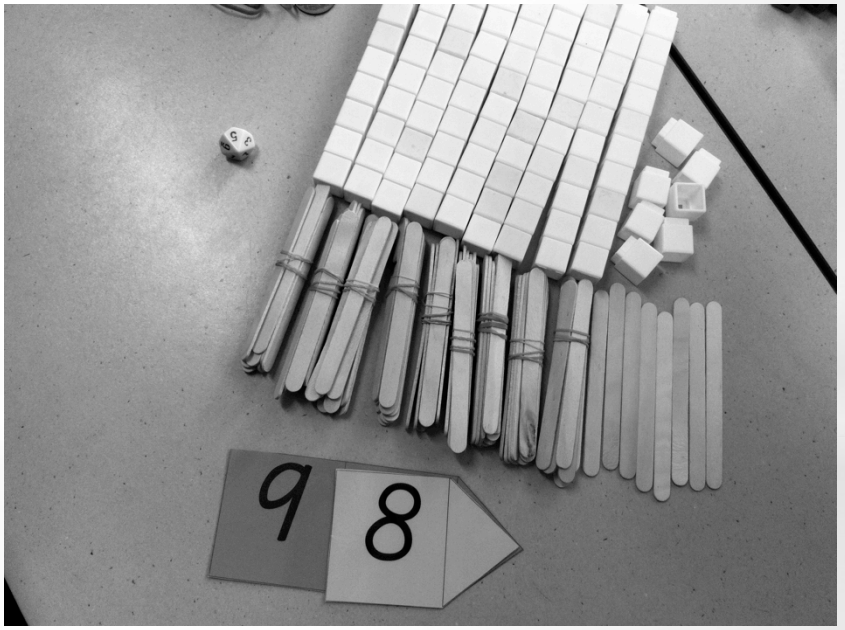
Bean sticks

How many?

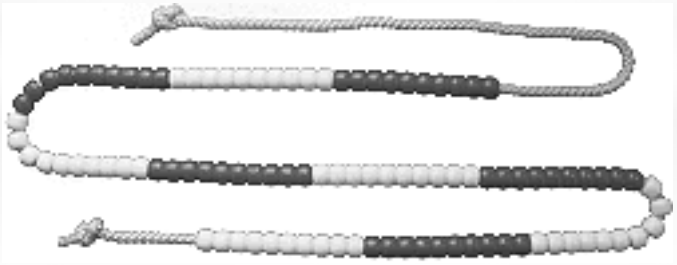


Three other ways…





Assist children to develop a mental number line that continues to expand as their understanding of number expands. The use of a long chain of 120 beads or unifix blocks is a good way to begin this development.



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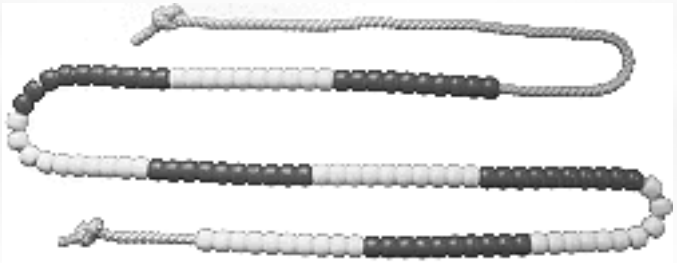
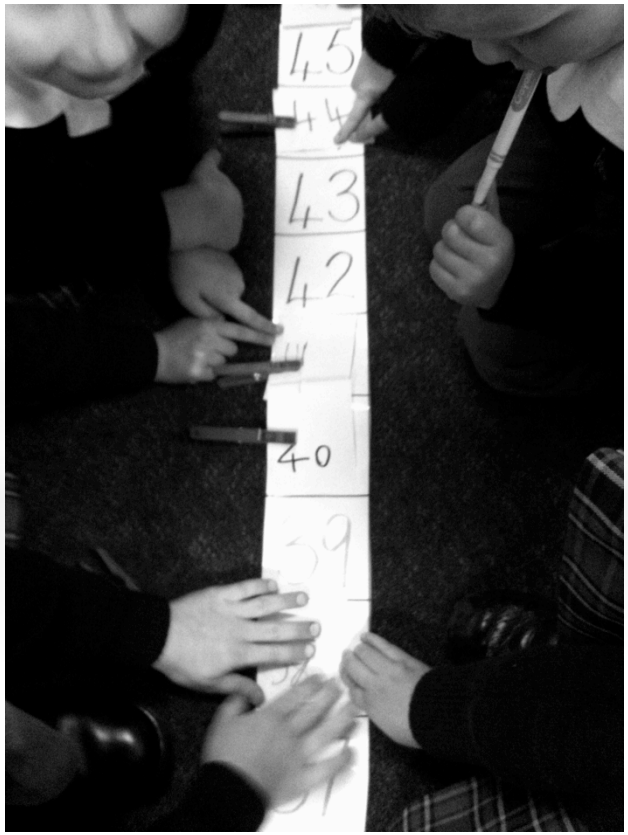


At first children will count by ones, but eventually they will find faster ways of locating the collections..

Connecting these experiences to finding numbers on a number line (such as a tape measure) is also important as is locating numbers on an empty number line.



Constructing a number chart

Calculator counting

Calculator counting contributes to a better grasp of large numbers, thereby helping to develop students number sense.

"It is a machine
to engage children
in thinking about
mathematics"
(Swan and Sparrow 2005)

We used the
constant function
on the calculator
to count!

Calculator counting provides many opportunities to discuss patterns related to place value. Such counting also contributes to a better grasp of large numbers, thereby helping to develop students number sense.

For a true understanding of number relationships,
Teachers must encourage students to work with **quantity** in a variety of situations using **different** math manipulatives over an extended period of time.

*Classroom strategies

- ‘Roaming the known’ to build confidence
- Persevere
- Give them challenging questions and problems every day- hard thinking
- Long ‘wait’ time
- The ‘not telling’ stance
- Time to reflect on their actions
- Opportunities for reasoning
- Celebrate success

Models:

- Arrow cards
- Ten frames
- Ten structured bead strings
- Unifix sticks
- Place value mats
- Grouped objects in plastic bags
- Calculators
- Number charts/ lines

References

Van de Walle, J. A., & Lovin, L. H. (2006)
Teaching Student Centred Mathematics Grades K-3.

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