Developing number sense in Prep – Year 3

Factsheet

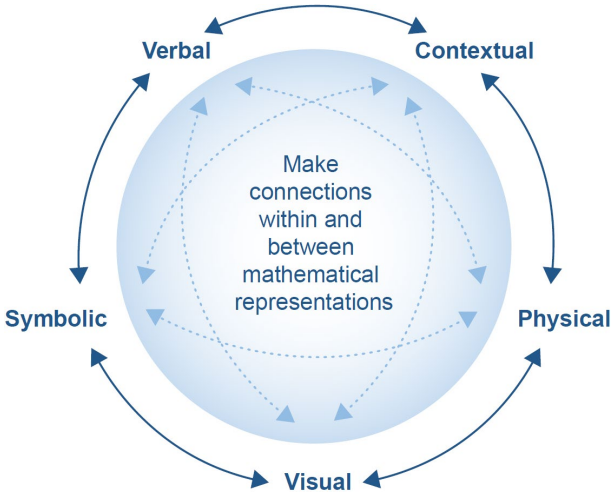
Key messages

Students who have a well-developed number sense are able to 'deconstruct quantities, keep track of the parts, put the parts back together in a different way to solve the problem, and know that the answer makes sense' (Steinke 2008).

The following information provides considerations and teaching and learning strategies for developing students' deep conceptual understanding of number magnitude and relationships. This helps to create a well-developed number sense.

Mathematical representations

Mathematical representations are extremely important in developing number sense, as they provide a way for students to access ideas in mathematics. Effective teaching of number engages students in making connections within and between the five types of representations: physical, visual, symbolic, verbal and contextual (National Council of Teachers of Mathematics 2014).



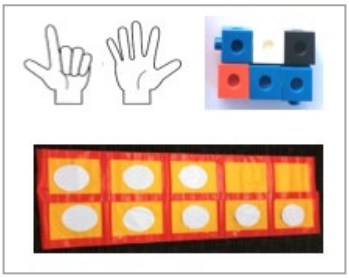
Fingers are children's earliest and most accessible way of representing mathematical ideas. Students' number sense is strongly linked to well-developed finger discrimination. Teachers can improve students' finger representations by providing activities that help students discriminate between their fingers (e.g. 'Activities for finger training', www.youcubed.org/wp-content/uploads/2017/03/Finger-Activities-vF.pdf).

Partitioning

Partitioning involves separating numbers into smaller parts and underpins the development of some important number sense understandings:

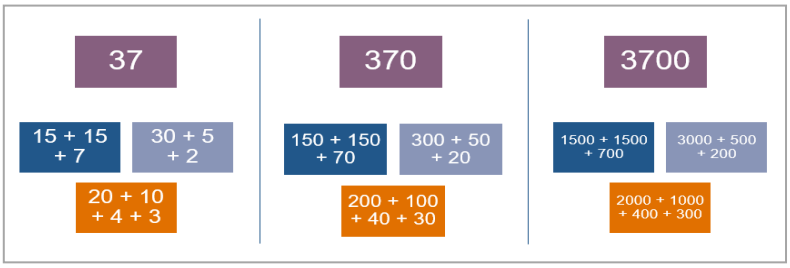
- Numbers can be represented as combinations of other numbers.
- There are multiple ways of breaking numbers into parts.
- The part–part–whole relationship can be used as a basis for operating.

A deep understanding of numbers is evident when students can partition numbers flexibly using standard and non-standard partitioning. Initially, number sense develops as students partition numbers using fingers and physical objects such as blocks and bead strings.



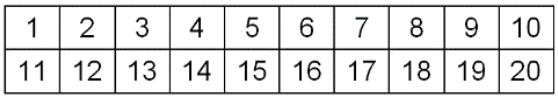
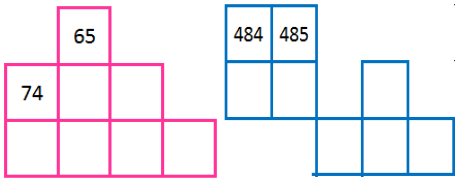
As understanding grows, teachers can introduce partitioning experiences that involve the use of more organised structures such as five frames, ten frames and ten tracks.

The aim is for students to eventually be able to flexibly partition increasingly complex numbers through making connections within and between place-value parts as in the examples on the right.



Number relationships

Working with and making connections between a range of mathematical representations provides opportunities for students to build their understanding of number relationships. Below is a suggested sequence for building students' structural awareness of the place-value system.

Stage	Description	Visualisation
1	Establish 10 as a base structure through the joint construction and use of a ten track (number path to 10).	
2	Add a second ten track beneath the first to build to 20 and look for patterns.	
3	Extend the 20 board to create a 50 board and then build to a 100 board. Examine the patterns formed at each stage. Once students are familiar with numbers to 100, begin number boards at increasingly large numbers such as 101 or 251, and explore the resulting patterns.	
4	Check for understanding using sections taken from the number board (as in the examples) that require students to use number relationships to add in missing numbers.	

Many students are able to overcome difficulties in understanding number sense when they can recognise the similarity in patterns within and between place-value parts.

References

Boaler, J, Chen, L, Williams, C & Cordero, M 2016, 'Seeing as understanding: The importance of visual mathematics for our brain and learning', Youcubed, www.youcubed.org/wp-content/uploads/2017/03/Visual-Math-Paper-vF.pdf.

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