Grade : Kindergarten

Critical concept: Number Sense:

Curricular content

Subitizing

Cardinality

Conservation

Language

Subitizing: to know a quantity at a glance without counting
(typically less than 10)

Cardinality: know that when you count, the last number you say is the quantity. E.g. Seven refers to the quantity of seven not the last one in the line that you touched as you counted

Conservation: trusting the count. If you have 5 counters and spread them out, you still have 5 in the set. If you squish them together you will still have 5.

Examples and Strategies

Subitizing

Subitizing: important for developing strong number sense and reducing the need to count from 1 every time. (Connection to reading- it would be very inefficient to read words one letter at a time. When students see chunks within a word, or whole sight words, they become much more fluent at reading).

Perceptual subitizing is knowing a quantity without counting. Students may not initially be able to match the quantity with a name- for example they may see 4 dots and then hold up 4 fingers and say “3”. They are still able to perceptually subitize the quantity. Their error is in the naming of the quantity.

Conceptual subitizing: subitizing two or more groupings and putting those together to name the quantity. Example; looking at 7 dots and seeing “2” and “5” without counting and naming “7”

It is important to subitize using different arrangements. Ten frames are essential as we are developing the anchor of 10. Lots of practice with ten frames will help students be able to see “how many more to 10”
Dot cards and other more random arrangements: are essential for building number sense and helping students see how numbers are composed of smaller parts (8 can be seen as 5 and 3, 2 and 6 etc).
When you use dots or arrangements other than ten frames, have a lot of conversations and questions such as “how did you figure this out without counting?”
Example:

Teaching tip: it is important to show images quickly when subitizing, to reduce the tendency to count individually.

Start with subitizing up to 5 then move to 10. Subitizing beyond 10 is not recommended.
-have students subitize until they can readily tell you how many
-have students tell you “one more” and “one less”
-How many more to get to 10?

Rekenreks, ten-frames, dot cards, tally marks: use all of these regularly to help students learn to subitize up to 10

One to One correspondence: saying one number for each object counted. This is a lot of practice with building sets. It is important to count objects of varying sizes within the same set as well. (example- a big rock doesn’t get counted as 2 just because it is bigger than a pebble).

Cardinality: counting sets and building sets with quantities up to 10. “Show me 5” means to show the quantity 5 rather than the 5th one that you counted. You can tell if a student doesn’t yet have cardinality if they have to recount when you ask “how many?”.

Teaching tip: Lots of practice with building sets of given quantities will help. In addition, have students estimate quantities and then count to see how close they were. When estimating, have students give an estimate that is too high, then one they are certain is too low, then a just right estimate. Over time, try to get the estimation bookends of too high and too low narrower. Encourage students to be fearless in their estimating. (By this we mean if there are erasers in a cup, 100 is clearly too high and 1 is clearly too low- but we want more thinking to happen and as students are more able, they should narrow their estimation window- a too high estimate might be 20 and too low might be 8 and the actual number is 11 for example)

	<u>Conservation:</u> understanding that different arrangements of the same quantity are equal. For example, count out 7 counters together with the child. Move the counters farther apart- how many are there? Move them closer together- how many are there? Put them into a cup and shake them out onto the table. There are still 7. Conservation also refers to a sense of quantity. Sometimes 5 objects can take up lots of room and sometimes hardly any room at all. Think of 5 cars vs 5 pencils. The quantity is the same. Size is different from quantity. **Teaching tip:** When developing a sense of quantity, think about context. Have lots of discussions about numbers such as "Eight is a lot of children in a family, but not a lot of children in a classroom" or "18 is a lot of cars but not a lot of rocks in the sandbox" '100 would be a lot of people in a room, but not a lot of cheerios in a bowl" More good questions to ask: when is 8 a lot? When is 8 a little? How could we make 8 using three parts? Can you share 8 equally with another person? How close is 8 to 10? How does 8 compare to your age? Your mum's age?
	Where does this lead? making 10, understanding how to "count on" early stages of addition and subtraction leads into Skip counting/ counting multiples

Grade : Kindergarten

Critical concept: **Sequencing and Partitioning**

Curricular content	Examples and Strategies
Sequencing numbers 0-10 Paritioning numbers 1-10 By decomposing and recomposing Benchmarks 5 and 10	**Sequencing numbers 0-10:** Make sure we introduce the concept of zero- sometimes we forget to explicitly teach this. Zero becomes easier to understand if you start with a quantity and repeatedly reduce it by 1 until you have none left. (Example- put 3 cubes in a cup, then another cup with 2, another cup with 1 and the final cup has 0) With sequencing it is important to develop the concept of comparison- using more than, less than, same as. There are many opportunities to discuss quantities by comparing. Are more of you wearing red or blue? Walk to school or took the bus? Who has the most letters in their names? The least? Line up in order of letters in names. Building sets with more and less than a given quantity. Moving to a more abstract representation of quantity using numberlines is a jump. Start by building numberlines with actual sets of objects that you can place along the numberline. Cards are a good stepping stone to abstract as you can count the "hearts" on the cards to see the quantity. Circle counting is another great way to develop sequencing concepts. Before counting out loud, teacher might say "we are going to start with 1 and count around the circle- what number do you think Claire might say" and point at Claire who is half way around circle. Discuss how people arrived at their guesses. Is it likely that Claire might say "2"? Why or why not? You don't always have to start with 1 when counting around a circle. Teacher may say they are going to count starting at 4, or count backwards starting from 15 etc. Create a "numberline" with numeral cards. Watch for students eventually to be able to place the cards in the random order that they get them, rather than starting with finding a "1" or a "0" and then searching the whole pile to find the next number. **We want students to start seeing the magnitude of the difference between the numbers. Encourage them to lay cards and leave space between for the other numbers Example 2 ____ 8 ____ 10 Handing cards out randomly to students and have them put themselves into a numberline order is a good routine. A variation is hand out cards to students randomly and then have them one at a time find their place in the line. This means they need to leave a space where there are missing numbers etc. **Decomposing and Recomposing numbers to 10** -showing a number as being composed of its parts- or smaller numbers Start with decomposing and recomposing numbers to 5 then move up to 10 Example tasks - show 8 in as many ways as possible: 5 and 3; 7 and 1; 4 and 4 etc. Can you make 8 using three parts? This is a great extension question. -count out double sided counters into a cup. Shake them out and have the students say the number sentence e.g. if you used 8 counters then there may be 6 red and 2 yellow makes 8 counters -partition on your hands: show 6 using both your hands (4 and 2; 5 and 1 etc) -mystery number: student counts cubes into a jar (example 5 cubes). Have students close their eyes while you take some out and hold them in your hand. Open eyes, students decide how many counters you must be holding. -Use unifix cubes and link a set number together (e.g. 10) Have students hold the tower in their hands then break it into two pieces. Say the sentence. 10 is "8 and 2". This is easier to see if you build the tower of 10 with five cubes of one colour and five of another.
Language Decomposition: really important to know this word- it will show up until grade 12☺ (and beyond) Recomposing just means putting the parts back together to show that the total is the sum of the parts. Example: 10 decomposes into 7 and 3 and when you put 7 and 3 back together you will have 10	

	Benchmarks of 5 and 10 are super important. -make five and ten in as many ways as possible -recognize 5 and 10 in ten frames -be able to tell how many more to 5 and how many more to 10
	Where does this lead? Sequencing and leaving the spaces between will lead naturally into subtraction, which is where we are looking to find the magnitude of the difference between two numbers Sequencing is central to a strong sense of number. Understanding quantities in relation to other quantities is critical not only for whole number sense, but developing understanding of fractions and decimals, percentage and more. Partitioning: once numbers are larger than 10, we often have to decompose the number in order to manipulate it to solve more complicated equations. Mental math strategies all rely on the ability to decompose numbers.