Cluster 3: Understanding Equality and Place Value to Compare Numbers

Duration: 4-6 weeks

Content Standards:
This list includes standards addressed in this cluster, but not necessarily mastered, since all standards are benchmarks for the end of the year. Note strikethroughs and recommendations in the Important Considerations section for more information.

NC.1.NBT.1 (number sequence) and **NC.1.NBT.7** (written numbers) are continued areas of focus. These should be woven into and reinforced in instruction throughout the year.

NC.1.NBT.2
Understand that the two digits of a two-digit number represent amounts of tens and ones.
- Unitize by making a ten from a collection of ten ones.
- Model the numbers from 11 to 19 as composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
- Demonstrate that the numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens, with 0 ones.

NC.1.NBT.7
Read and write numerals, and represent a number of objects with a written numeral to 100.

NC.1.NBT.3
Compare two two-digit numbers based on the value of the tens and ones digits, recording the results of comparisons ~~with the symbols >, =, and <.~~

NC.1.MD.4
Organize, represent, and interpret data with up to three categories.
• Ask and answer questions about the total number of data points.
• Ask and answer questions about how many in each category.
• Ask and answer questions about how many more or less are in one category than in another.

NC.1.OA.1
Represent and solve addition and subtraction word problems, within 20, with unknowns, by using objects, drawings, ~~and equations with a symbol for the unknown number to represent the problem~~, when solving:
- Add to/Take from-Change Unknown
- Put together/Take Apart-Addend Unknown
- Compare-Difference Unknown

Mathematical Practices:
1. Make Sense of Problems and Persevere in Solving Them
2. Reason Abstractly and Quantitatively
3. Construct Viable Arguments and Critique the Reasoning of Others
4. Model with Mathematics
5. Use Appropriate Tools Strategically
6. Attend to Precision
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

What is the mathematics?
- Students engage in numerous grouping activities by experimenting and showing amounts of items in groups of like size collections. In Kindergarten students began to subitize numbers (instantly see how many) less than ten. In this cluster, they continue to develop thinking in collections, by grouping together items of like size collections (ex. How many towers of four can you snap together in five minutes? How many towers of five?). Eventually students

should begin grouping by tens and showing the number of items as groups of ten and some more.

- Through experiences with groupable, proportional models such as a ten stick of cubes, rekenreks, groups of ten objects banded together or in a cup, or red/yellow chips on a tens frames, students begin to see 10 as ten ones and a group of ten. This concept is known is unitizing.
- Students make connections among representations including the symbolic number, the number word, and the number of tens and ones (ex. 47 is forty-seven is 4 tens and 7 ones).
- Building on Cluster 1, students should continue to pose questions and collect data about themselves, their surroundings, or about topics they are working on in other subject areas. Posing questions, collecting data, and analyzing data becomes the context in which student practice grouping by 10s and comparing quantities in two categories.
    - For example, students might divide into 3 teams and work to collect as many leaves as possible in a minute time frame. After the time is up, students work together to count the number of leaves they have collected. As students are counting the teacher might encourage students to count by groups to make counting easier, eventually counting by 10s. After counting the leaves, the quantities each team has collected can be compared (ex: How many more leaves were collected by team 2 than team 3?). Students can also use the language 'greater than', 'less than' and 'equal to' to compare the number of leaves collected by each team.
- Compare-difference unknown word problems are introduced at this point. Students should use models to directly compare the quantities represented in the problem. Examples of compare-difference unknown problems are shared below:
    - Taylor and Hayden have been collecting seashells at the beach. Hayden collected 12 shells. Taylor collected 9 shells. How many more shell did Hayden collect than Taylor? A student might work to solve this problem by creating a tower of 12 cubes and a tower of 9 cubes. By holding the towers side by side, the student would see that a tower of 12 is 3 cubes taller than a tower of 9. This means Hayden collected 3 more shells than Taylor.
    - A bowl of fruit has 13 strawberries and 15 grapes. How many less strawberries are there than grapes in the bowl? - To solve this problem a child might draw circles to represent strawberries. Then underneath those circles, the child might draw 15 circles to represent the grapes. It could then be noticed that there are 2 less strawberries than grapes. Models used for connecting place value to the operations should be proportional and groupable.
- Models used for place value should be proportional and groupable.
    - Models should be proportional (that is, ten units actually equal a group of ten). Non-proportional models (ex. One dime equals ten pennies) should be **avoided** at this time as students first need to make sense of place value
    - Models should also be able to be grouped and ungrouped (ex. beans in a cup; counters on a ten-frame; ten sticks made out of snap cubes) are more helpful as students explore what it really means to "build a ten." Base Ten Blocks should be **avoided** at this time as making a trade with non-groupable items is a more abstract concept than actually being able to pull apart the model to break apart the ten.
- Students use the language of equality and comparison such as *greater than*, *less than*, and *the same value as*, and *equal to*. At this time students are NOT expected to record the results of comparisons with the symbols < , >, and = but rather with the words "greater than" and "less than." The symbols will be a focus in Cluster 4. Student compare quantities in real life contexts through the use of models (towers of cubes, counters with ten frames, hundreds boards, number lines, number balances, etc.)

Important Considerations:

- Even though students have been working within the number 20 thus far, this is the time in which they can compare larger numbers. Be mindful that many students may still count by ones without any effort to group materials into piles. Taking the time to provide ample experiences to group items is important to build a conceptual understanding of unitizing. Ten frames will be helpful to students as they make groups of 10.
- Students should be given ample opportunities to verbalize the structure of their groups and the connection between the number of tens and ones to the two-digit number through small group and whole group discussions.
- Students who can say that a number has __ tens and ___ ones may still need support making the connection to the base-10 structure. (Ex. After a student counts a pile of beans and you can ask how many cups the child would need if they put ten beans in each cup, they may begin counting rather than making connection to the meaning of the tens place in the number.)
- At this time students should be working with proportional, groupable base ten models such as snap cubes or red/yellow counters on a tens frame so that they can compose and decompose tens themselves (ex. Snap cubes can be taken apart and put together in groups of ten by students. Base-ten blocks cannot be physically ungrouped. Similarly, a dime to represent ten is not proportional; that is, it is not ten times bigger than a penny).
- Students often have the misconception that the equal sign means “to give the answer” when it simply means “is the same value as.” Students should have the opportunity to explore with number balances in order to build the concept of equality and how finding the unknown in a problem is all about finding the balance.