Counting and Cardinality

Know number names and the counting sequence. **NC.K.CC.1** Know number names and recognize patterns in the counting sequence by: • Counting to 100 by ones. • Counting to 100 by tens.	
Clarification	**Checking for Understanding**
In this standard, students rote count by starting at one and counting to 100. • When counting by ones, students need to understand that the next number in the sequence is one more. • When students count by tens they are only expected to master counting on the decade (0, 10, 20, 30, 40 …). Students need to understand that the next number in the sequence is "ten more" (or one more group of ten). The focus of this standard is on using patterns in the number sequence to count. It does not require recognition of numerals or writing numerals.	Start at 1 and count by ones. Students should be able to count correctly to 100 by ones without skipping numbers, repeating numbers, or hesitating. Start at 10 and count by tens. Students should be able to count correctly to 100 by tens without skipping numbers, repeating numbers, or hesitating.

Know number names and the counting sequence. **NC.K.CC.3** Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20, with 0 representing a count of no objects.	
Clarification	**Checking for Understanding**
This standard calls for students to recognize and write numerals 0-20. • When shown a set within 20, students record the quantity by selecting the appropriate number card/tile (numeral recognition) or writing the numeral. • When given a numeral, students create a set of items to represent the numeral presented. Due to variations in the development of students' fine motor and visual skills, reversal of numerals is anticipated and acceptable as long as it does not affect place value. While reversals should be pointed out to students and correct formation modeled in instruction, the emphasis of this standard is on the use of numerals to represent quantities rather than the correct handwriting formation of the actual numeral itself. While children may experiment with writing numbers beyond 20, this standard places emphasis on numbers 0-20.	As the teacher says a number aloud, the student records the written numeral:  After counting a set of objects, student is asked to record the numeral that represents the quantity. The student records the written numeral "19". After counting a set of objects, student is asked to select the number card that matches the quantity. The student selects "13" to represent the set.

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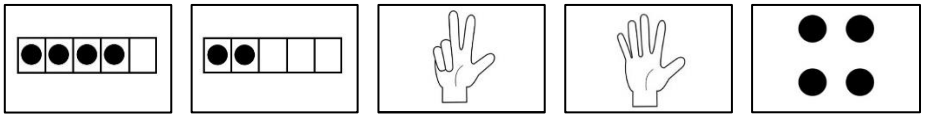
Count to tell the number of objects.

NC.K.CC.4 Understand the relationship between numbers and quantities.

- When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object (one-to-one correspondence).
- Recognize that the last number named tells the number of objects counted regardless of their arrangement (cardinality).
- State the number of objects in a group, of up to 5 objects, without counting the objects (perceptual subitizing).

Clarification	**Checking for Understanding**
When given frequent opportunities to count sets of objects, students develop counting skills and discover the relationship between quantity and number. • Students implement correct counting behaviors by moving or pointing to one object at a time (one-to-one correspondence) and using one counting word for every object (synchrony/ one-to-one tagging), while keeping track of objects that have and have not been counted. This is the foundation of counting. • Students discover the cardinality principle by counting objects in a set and understanding that the last number stated (…8, 9, **10**) represents the total amount of objects: "There are **10** bears in this pile." Since an important goal for children is to count with meaning, it is important to have children answer the question, "How many?" after they count. Often, children who have not developed cardinality will count the amount again, not realizing that the **10** they stated means 10 objects in all. • One-to-one correspondence and cardinality are higher-level skills, which require students to analyze, reason about, and explain relationships between numbers and sets of objects. The expectation is that students are proficient with these skills (with numbers 1-20) by the end of Kindergarten. • When frequently shown small sets of items, students develop the ability to instantly recognize the quantity in a set without counting (perceptual subitizing). Most individuals can perceptually subitize up to sets of five. Perceptual subitizing is a crucial early skill. It strengthens students' ability to efficiently and flexibly determine "how many" when working with larger sets and supports work with composing and decomposing quantities. Perceptual subitizing is also a precursor to place value (e.g., groupings of tens) as it gives students the opportunity to see a collection of items as a unit, rather than individual items. • There are two types of subitizing: perceptual and conceptual. This standard focuses on perceptual subitizing. See standard NC.K.OA.6 for information about conceptual subitizing.	Student is given a tray of buttons and asked to count the set. After counting, the teacher says, "How many buttons are in this set?" Then, the teacher rearranges the buttons (without adding to or taking from the set). The student is asked, "How many buttons are in the set now?" Student is shown a "quick image" card for 2-3 seconds and asked to tell "how many" without counting. Student instantly recognizes the quantity and states the number (perceptual subitizing). Steps are repeated with additional cards. 

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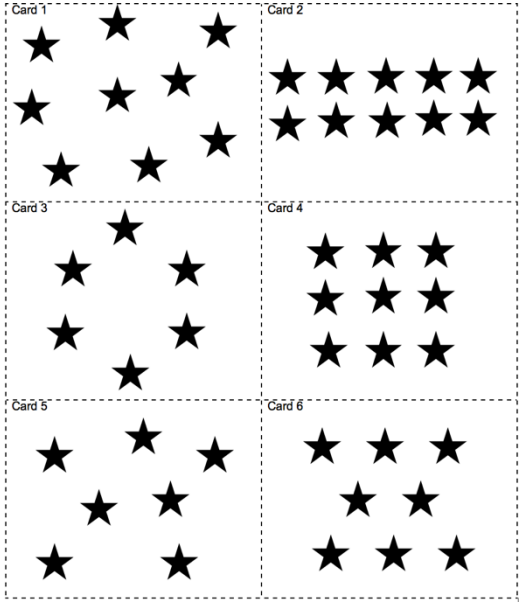
Count to tell the number of objects.

NC.K.CC.5 Count to answer "How many?" in the following situations:

- Given a number from 1–20, count out that many objects.
- Given up to 20 objects, name the next successive number when an object is added, recognizing the quantity is one more/greater.
- Given 20 objects arranged in a line, a rectangular array, and a circle, identify how many.
- Given 10 objects in a scattered arrangement, identify how many.

Clarification	**Checking for Understanding**

When counting to answer "how many", students employ two big understandings from NC.K.CC.4: one-to-one correspondence and cardinality. They say one number for each item counted (one-to-one correspondence) and know the last number counted tells the quantity of the set (cardinality).
• This standard asks that students are both counters and producers.
  ○ **Producer**: When given a number, a student counts out a set of objects or draw a picture to match.
  ○ **Counter**: When given a set of objects or drawings, a student counts to determine "how many".
• After numerous experiences with counting objects, along with the developmental understanding that a group of objects counted multiple times will remain the same amount, students recognize the need for keeping track in order to determine "how many". Some arrangements, such as a line or rectangular array, are easier to count. However, they may limit students' flexibility with developing meaningful tracking strategies, so providing multiple arrangements help children learn how to keep track. Since scattered arrangements are the most challenging, this standard specifies that students only count up to 10 objects in a scattered arrangement and count up to 20 objects in a line, rectangular array, or circle. Depending on the amount of objects to be counted, and students' confidence with counting a set of objects, students may move the objects as they count each, point to each object as counted, look without touching when counting, or use a combination of these strategies.
• An important component of this standard is that of naming the next successive number when an object is added to a set, which is based on the idea of inclusion. Inclusion is the understanding that numbers build by exactly one each time and that they nest within each other by this amount. A set of three objects is nested within a set of 4 objects; within this same set of 4 objects is also a set of two objects and a set of one. Using this understanding, if a student has four objects and wants to have 5 objects, the student is able to add one more- knowing that four is within, or a sub-part of, 5 (rather than removing all 4 objects and starting over to make a new set of 5). This concept is critical for the later development of part/whole relationships.
	"Producing a Set" Task:
	• Teacher places a bowl of objects on table and asks student to count out a set of 15 objects.
	• Student removes 15 objects from the bowl and places them on the table while counting aloud.
	• Teacher adds one more object to the set of 15, and asks, "How many are there now?"
	Rather than re-counting the entire set, the student says the next number in the counting sequence…16.
	
	"Counting a Set" Task: Given a set of cards, students count the quantity of stars in each arrangement.
	 

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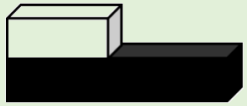
Compare numbers.

NC.K.CC.6 Identify whether the number of objects, within 10, in one group is greater than, less than, or equal to the number of objects in another group, by using matching and counting strategies.

Clarification	**Checking for Understanding**
This standard calls for students use their counting ability to compare two sets of concrete objects (0 to 10). Early comparisons involve matching objects from each set in order to see if a group has extras, or repeatedly removing one object from each group until only one group is left with extra objects. Later, students apply their knowledge of number to count the objects in each group, determining which group has more/less. An important goal of this standard is to develop comparison language: more/greater, less/fewer, and equal/same amount. This language supports standards in successive grades where students are asked, "How many more?" and "How many less?"	Students are given a set of triangles and a set of squares. They are asked to find which set has more. *Possible responses:* Student A Matching *I lined up one square and one triangle. Since there is one extra triangle, there are more triangles than squares.*  Student B Equal Shares *I put them in a pile. I then took away objects. Every time I took a square, I also took a triangle. When I had taken almost all the shapes away, there was still a triangle left. That means that there are more triangles than squares.* Student C Compare Counts *I counted the squares and I got 4. Then I counted the triangles and got 5. Since 5 is bigger than 4, there are more triangles than squares.*

Describe and compare measurable attributes.
NC.K.MD.2 Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference.

Clarification	Checking for Understanding
In this standard, students will make direct comparisons of attributes that can be measured, such as length, weight, and size. Direct comparisons are made when objects are put next to each other (e.g., two children, two books, two pencils). Students must be able to move the objects next to each other to compare their lengths or hold them to compare weights. As kindergarten students continually compare objects by length, they discover the importance of lining up the ends of objects in order to have an accurate measurement. **For example**: A student lines up two blocks and says, "The black block is a lot longer than the white one."  A student picks up two books and says, "The red book is heavier than the blue book," or "The red book is bigger than the blue book."	Find an object in our classroom that is shorter than this straw. Find an object that is longer than this straw. Student A: *A crayon is shorter than the straw, and a pencil is longer. I know because I lined their ends up. The crayon didn't stick out as much as the straw, so it's shorter. The pencil stuck out more than the straw, so it's longer.*   Student B: *This block is shorter than the straw. I know because I stood the straw up next to the block. The straw was longer, so the block is shorter.*

Geometry

Identify and describe shapes.
NC.K.G.1 Describe objects in the environment using names of shapes, and describe the relative positions of objects using positional terms.

Clarification	Checking for Understanding
In this standard, students locate and identify shapes in their environment. At first students may use informal names e.g., "balls," "boxes," "cans". Eventually students refine their informal language by learning mathematical concepts and vocabulary and identify, compare, and sort shapes based on geometric attributes. Students also use positional words such as above, below, beside, in front of, behind and next to, to describe objects in the environment. Students should be able to identify the location and position of actual two-and three-dimensional objects in their classroom/school. By the end of Kindergarten, students should be able to describe location and position of two- and three-dimension representations on paper.	Look around the classroom. • Where do you see a cone? • Show an example of a square? • What shape is the door? • Do you see a shape next to the door?

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