New York State Next Generation Mathematics Learning Standards Unpacking Document (DRAFT)

GRADE: K	DOMAIN: Counting and Cardinality

CLUSTER: Count to tell the number of objects.

Students move from rote counting to finding the number of objects in a set. They start making connections to number names and one-to-one correspondence with quantities to twenty by saying number names in standard order when counting objects and by pairing each object with one and only one number name. Exposure to "how many" questions reinforces cardinality and the understanding that the last number name said tells the number of objects counted. Students develop fluency in saying the count sequence, so that they have attention to focus on the pairings involved in counting objects. (Common Core Standards Writing Team. (2011, May 29). K-5 Progression on Counting and Cardinality and Operations and Algebraic Thinking. Tucson, AZ: Institute for Mathematics and Education, University of Arizona.)

Grade Level Standard:

NY-K.CC.4 Understand the relationship between numbers and quantities up to 20; connect counting to cardinality.
NY-K.CC.4a 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. (1:1 correspondence)
NY-K.CC.4b Understand that the last number name said tells the number of objects counted, (cardinality). The number of objects is the same regardless of their arrangement or the order in which they are counted.
NY-K.CC.4c Understand the concept that each successive number name refers to the quantity that is one larger.
NY-K.CC.4d Understand the concept of ordinal numbers (first through tenth) to describe the relative position and magnitude of whole numbers.

PERFORMANCE/KNOWLEDGE TARGETS
(measurable and observable)

- Pair one number with one object when counting.
- Associate a number with a set of objects, up to 20.
- Demonstrate that a quantity does not change with physical arrangement.
- Tell the number that is one larger.
- Use ordinal numbers to describe position.

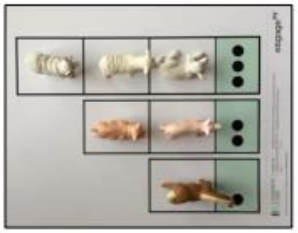
ASPECTS OF RIGOR

Procedural Conceptual Application

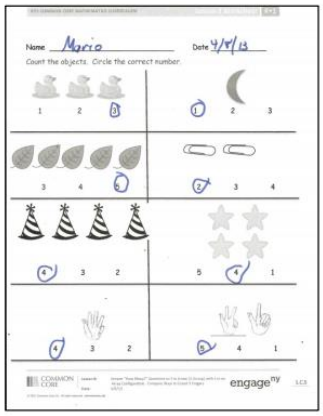
MATHEMATICAL PRACTICES	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
FOUNDATIONAL UNDERSTANDING	**NY-PK.CC.3** Understand the relationship between numbers and quantities to 10; connect counting to cardinality. **NY-PK.CC.3a** 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. (1:1 correspondence) **NY-PK.CC.3b** Explore and develop the concept that the last number name said tells the number of objects counted, (cardinality). The number of objects is the same regardless of their arrangement or the order in which they were counted. **NY-PK.CC.4a** Answer counting questions using as many as 10 objects arranged in a line, a rectangular array, and a circle. Answer counting questions using as many as 5 objects in a scattered configuration. **NY-PK.CC.4b** Given a number from 1–10, count out that many objects.

The following pages contain EXAMPLES to support current instruction of the content standard and may be used at the discretion of the teacher and adapted to best serve the needs of the learners in the classroom.

From the moment students enter school, they practice the counting sequence so that when counting a set of objects, their attention can be on matching one count to one object, rather than on retrieving the number words. Experience with counting objects arranged in different configurations allows students to discuss and come to understand that the number of objects is the same regardless of their arrangement (conservation). Finally, students will build an understanding that each successive number name refers to the quantity that is one larger, developing part/whole relationships. Prior to reaching this understanding, a student might have to recount an entire collection to which a single object has been added. (Common Core Standards Writing Team. (2011, May 29). *K-5 Progression on Counting and Cardinality and Operations and Algebraic Thinking*. Tucson, AZ: Institute for Mathematics and Education, University of Arizona.) Students should begin with counting concrete objects, progress to pictures, and then connect the physical representations to the numerals. This standard should first be addressed using numbers 1-5, then building to numbers 1-10, and then later in the year, using numbers 1-20. The grade-level expectation is that students will understand the relationship between numbers and quantities up to 20 by the end of kindergarten.



Concrete Objects



Pictures

Example 1: Number Paths
Taken from EngageNY PK Module 3 Family Newsletter, Topics E-H

Students work with the number paths, placing one object in each space on the number path. Students can see that the last number said (and the last space filled) tells the number of objects counted. For example, in the image of the sheep below, the student can touch and count the sheep and come to understand that the numeral 6 tells the total number of sheep.

To develop counting with meaning, students can answer questions such as “How many sheep are there?”and “How many sheep do you have?” Understanding of successive numbers can be developed through the use of the number path and answering the question, “How many sheep would there be if we added one more?”and “Suppose we wanted 7 sheep, how would our number path change?” These questions, in combination with the visual, will help students transition from re-counting an entire collection to recognizing the part/whole relationships that exist within a quantity (adding one more and knowing that six is within, or is a sub-part of 7).

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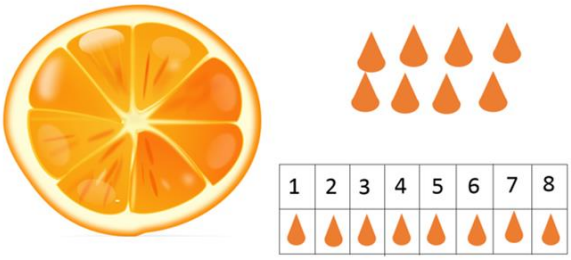
Students can be presented with different configurations of objects that also demonstrate part/whole relationships such as the following:



Similar tasks support work with grade-level standard NY-K.G.6 *Compose larger shapes from simple shapes*, and students can be asked to come up with other real-world examples such as pizza slices.

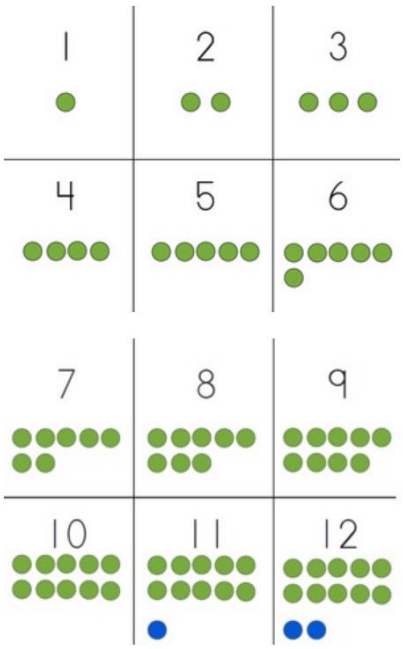
Example 2: Taken from Illustrative Mathematics Task: Counting Mat (content licensed under CC BY-NC-SA 4.0)

Materials

- Counting Mats
- Small objects to count, such as bears or tiles.

Action

The teacher gives students the counting mat and many small objects to count with. Some students will automatically read the numbers and assemble the correct number of object then match them to the dots on the counting mat to verify they counted correctly. Other students who need more scaffolding will match each object to a dot. Students who do it this way should be guided to count the objects once they have assembled them on the dots. Once a student is done with each number they can move on to the next number. The teacher should do a quick check of a student's work before the student begins working on the larger numbers.



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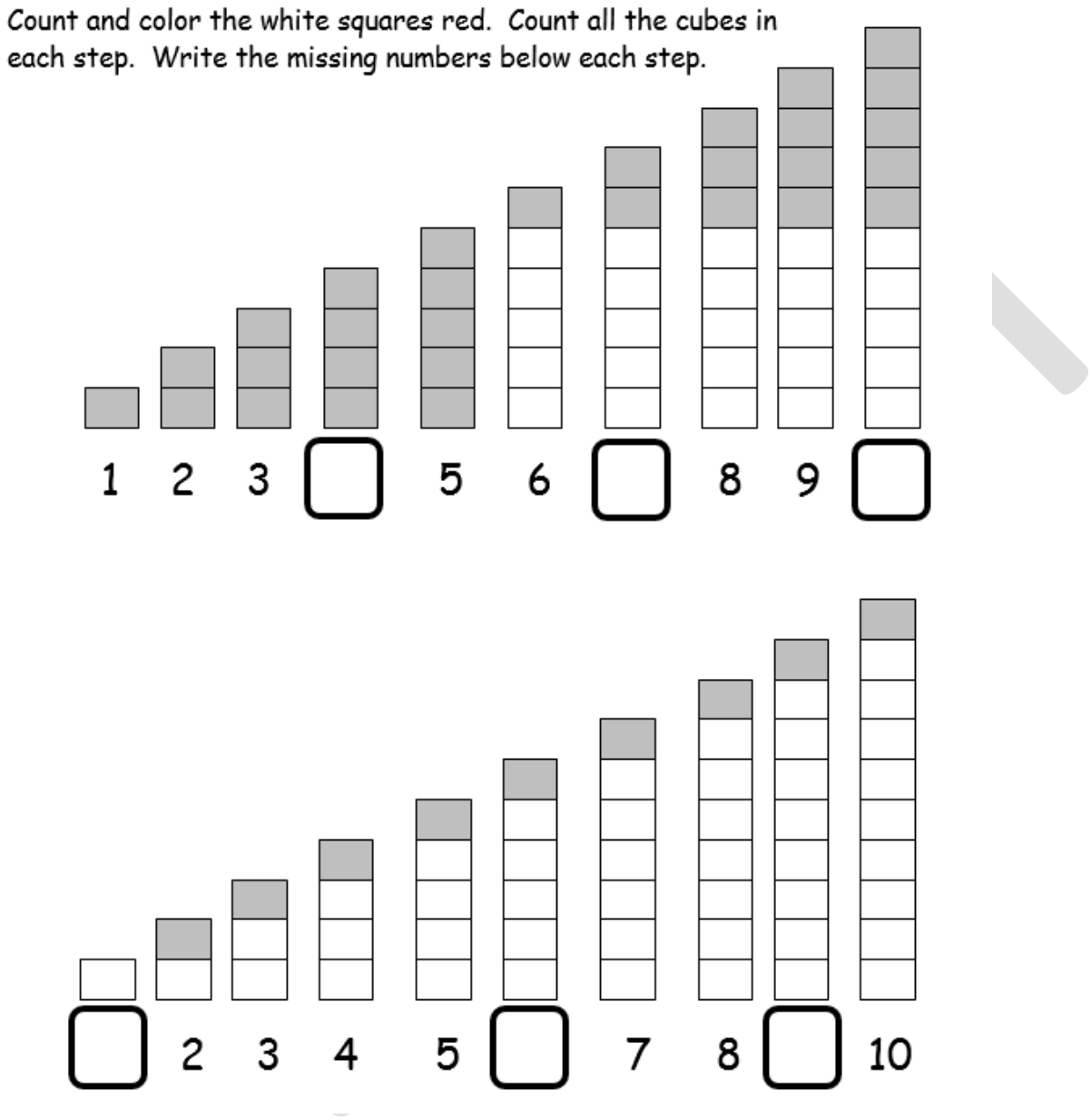
Example 3: Number Stairs

Number stairs (Unifix/linking cubes) make it easy for students to see that each successive number in the count sequence is "one" more: "One. One more is 2. Two. One more is 3…"

The following is taken from EngageNY K Module 1, Lesson 30, pgs. 297-300.



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Example 4: Ordinal Numbers
The following is taken from EngageNY Kindergarten Module 6, Lesson 4, pgs. 53-54.

Materials: (S) Shapes (Template), scissors

T: How many shapes do you see on your paper? Raise your hand when you know. Call it out at my signal! (Wait until most hands are raised, and then signal.)

S: 10.

T: Cut out each shape card by cutting on the dotted lines. (Allow students time to cut.)

T: Make a row out of your shapes. Now, rearrange your shapes so that the first shape from the left is a circle. (If necessary, review left and right.) Make your second shape the smaller triangle. Keep your row straight! Now, arrange it so that your third shape is a circle with a chunk missing. Share with your partner. What is the next shape in your row?

S: It is a heart. → Mine is a square. → Mine is a different triangle.

T: Student A, count your shapes starting from the left, stopping at the cross.

S: 1, 2, 3, 4.

T: You stopped at shape number 4. We would say that the cross is your fourth shape!

T: Tell your partner your fourth shape. Use the words, "My fourth shape is _____."

S: (Do so.)

T: Student B, what is the last shape in your row?

S: Mine is the big triangle.

T: Student B, count your shapes starting from the left and stopping at the big triangle.

S: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

T: Tell your partner what your tenth shape is. Use the words, "My tenth shape is _____."

S: My tenth shape is the one that looks like the outside of a can. → My tenth shape is the heart.

T: Mix up all of your shapes again.

T: This time, we are going to make a column of your shapes. Our columns will all be the same, so listen carefully.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Challenge students performing above grade level by giving them an opportunity to call out an arrangement of shapes using ordinal numbers. Clearly explain what they are to do: "Call out different shapes by saying, for instance, first put your square on the table, put your triangle second in the row, etc." Let them lead the game for the whole class or in small groups.

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- Make the first shape, the one at the top of your column, a square.
- Second, the large triangle.
- Third, a cross.
- Fourth, a circle.
- Fifth, a heart.
- Sixth, the hexagon.
- Seventh, the circle with a chunk out of it.
- Eighth, the small triangle.
- Ninth, the diamond (rhombus).
- Tenth, the one that looks like part of a can.

T: Start at the top of your column and count down 5 shapes. What is your fifth shape? Use the words, "My fifth shape is _____."

S: My fifth shape is a heart.

T: Count from the top, and then put your finger on the last shape in your column. How many shapes did you count?

S: 10.

T: Yes. Your finger is on your tenth shape. What is your tenth shape? Use your words.

S: My tenth shape is the one that looks like a can.

Continue practicing this way until students demonstrate an understanding of the relationship between the positions of the shapes and the resulting ordinal descriptions.

T: We are going to play Simon Says with your shapes. Simon says, make a row of shapes. Simon says, make your sixth shape a heart. Simon says, make your ninth shape a square. Simon says, make sure that your first shape is a triangle. Put your finger on the third shape.

S: You didn't say Simon Says!

Continue the game in this manner, monitoring accuracy and allowing students to gain fluency in identifying the ordinal positions in preparation for the Problem Set.

T: Turn to your partner and tell him about your column of shapes. Use your math words to describe the position of each shape in the line.

S: My first shape is a circle. My second shape is a heart. My third shape is a circle with a chunk missing. (Continue through to the tenth shape.)

Circulate to observe the conversations and to encourage precision in the language.