Kindergarten Standards & Resources

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Purpose

- Examine components of the NC2ML Instructional Framework.
- Understand how Tools4Teachers supports implementation of the Instructional Framework.
- Peruse Tools4Teachers resources.
- Unpack two essential instructional resources.
Collaborative Instructional Frameworks
Revised NCSCOS for Mathematics*
Unpacking Documents*
Instructional Framework
Student-Centered Lessons
Instructional & Assessment Tasks

Number Talks Resources
Instructional Videos
Student Work Samples
Parent/Family Materials
PD Modules

*NCDPI led projects
Welcome, Kindergarten Math Teachers.

Resources on this page are organized by the Instructional Framework. Click on the Cluster in the table below to be taken to the resource page for lessons, tasks, and additional resources for teaching the NC Mathematics Standard Course of Study.

### Instructional Framework Introduction

The purpose of this document is to connect and sequence mathematical ideas to enable teachers to plan learning opportunities for students to develop a coherent understanding of mathematics. Clusters and sequencing are designed to foster students' meaning making of the connections among mathematical ideas and procedures. This meaning making occurs over time. Therefore, the concepts are included in multiple clusters with increasing depth. They build across the year beginning with conceptual understanding and moving toward procedural fluency.

Each cluster includes a list of related content standards and range of suggested duration. Standards indicate the mathematics expectations of students by the end of the school year. Standards are introduced and developed throughout the year on the fact that

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<th>Standards</th>
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<td>MD.1, 2, 3; G.1</td>
</tr>
<tr>
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<td>Understanding the Relationship between Numbers and Quantities</td>
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## Kindergarten Mathematics Year at a Glance

This document provides a birds-eye view of the Kindergarten Math Instructional Framework. Please note, some standards are partially taught in early clusters. For complete understanding of content to be taught, visit the Kindergarten Math Instructional Framework.

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Cluster 3: Comparing Quantities with Counting and Spatial Relationships

Duration: 3-4 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.K.CC.1
Count to 400 by ones and by tens.

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.

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).

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.

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.

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.

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

Mathematical Practices:
1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
What is the mathematics?
Students continue to develop fluency in subitizing and counting through meaningful counting experiences that include spatial relationships. They begin to use numerals to identify and compare quantities up to 10.

The mathematical discourse established in Cluster 1 should continue to be embedded and utilized throughout each successive cluster.

Students compare quantities by:
- Counting a quantity in a set and comparing it to a quantity in another set (more, less, the same)
- Comparing a given set to 5 or 10 (Is it more than 5, less than 5, or the same as 5?)
- Comparing by matching objects (My tower of 8 cubes is taller than your tower of 3 cubes so there are more cubes.)

Students continue to develop the forward rote sequence through daily experiences. The target for this cluster is saying the forward rote sequence to 50 by ones and tens, but this number should not be a limit. Meaningful practice of the counting sequence should be part of daily activities in the classroom. This skill should be introduced at the beginning of the year and continued throughout the year. Listed below are general benchmarks for this standard.
  - Beginning of the Year: Count to 20
  - By the Middle of Year: Count to 50
  - By the End of Year: Count to 100

Students continue to develop informal geometric language about shapes (both 2-D and 3-D) as part of their sorting and comparing. Shapes will be formalized in Cluster 4.
Important Considerations:

- In Cluster 1 students describe objects based on attributes. In Cluster 2, they counted objects. In this cluster students begin comparing quantities. Some students may still be solidifying counting concepts while others may have started comparing with counting at the end of Cluster 2.
- Providing experiences within rich measurement, data, and geometry tasks and centers allows for differentiation and deepening of understanding as students count and compare with many different representations and within many different contexts (Ex. Whose block tower is the tallest? Did we use more cylinders or cubes in our tower? Did more people get lunch in the cafeteria or bring lunch from home?). Through these contexts students continue to build on NC.K.MD.1 and NC.K.MD.3 from Clusters 1 and 2 and to informally build a foundation for NC.K.G.1 in Cluster 4.
- Continuing to work with spatial representations of numbers are essential to support students’ development of subitizing and thinking in collections rather than counting by ones.
- Symbols for addition, subtraction, equals, greater than, and less than should not be introduced until the end of the year or even first grade. Instead use the words *more, less, and the same*. The purpose of symbols is to communicate relationships among numbers without context (ex. being able to say $3 + 4 = 7$ or $4 > 3$ does not rely on knowing what the things are that are being put together or compared). In Kindergarten, students work first to internalize these relationships in context (ex. three birds joining two birds on a branch; three hexagon pattern blocks and two triangles on my picture; a tower of four cubes is taller than a tower of three cubes). They describe the relationships with language (ex. 3 and 2 is 5; 4 is more than 3) and by labeling pictures (ex. In shake and spill with 5 two-color counters, color 3 red and label with three; color two yellow and label with 2).
- Students need time to explore the meaning of equals as “has the same value” rather than “the answer is coming” to avoid misconceptions about the equals sign that often persist into formal high school algebra. When writing, students use the word “is” to denote equal (ex. 4 is 3 and 1).
- Students begin counting by ones up to 50 and begin work on counting by tens using ten frames.
Launch, Explore, Discuss Lesson Framework

Why Does the Framework of a Lesson Matter?

Over two decades of research speaks to the value of allowing students to engage in productive struggle by posing cognitively demanding tasks that students can explore (Smith et al., 2008). Further, students from various backgrounds with varying levels of understanding have equal access to mathematics when teachers build lessons around the exploration of tasks (NCTM, 2014). Additionally, lessons that begin with a teacher-led or teacher-facilitated mini-lesson followed by practice don’t allow for learners to engage in productive struggle and develop conceptual understanding of mathematics concepts (Munter, Steins, & Smith, 2015; Polly, 2017). In elementary schools, mathematics curricular resources include varied instructional frameworks with differing potential to promote problem solving and opportunities for productive struggle. In line with recommendations from the National Council for Teachers of Mathematics (NCTM, 2014), we describe the launch-explore-discuss model which frames a lesson around a cognitively demanding task(s) that promote opportunities for productive struggle (Lappan & Phillips, 2009).

Elements of Launch-Explore-Discuss

The Launch-Explore-Discuss model focuses on the teacher serving as a facilitator of their students’ mathematical understanding by posing meaningful tasks, supporting students by providing opportunities for students to collaborate, use materials, and by posing questions to support task completion. To use this framework effectively, teachers must have clearly articulated mathematical goals for the lesson and identify ahead of time possible strategies that students may use to solve a mathematical task. The table to the right details each phase of the launch-explore-discuss model.

<table>
<thead>
<tr>
<th>Launch-Explore-Discuss Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Launch:</strong> Teacher introduces a cognitively demanding task to the students, ensures students are clear on the expectations and that they have access to materials (e.g., manipulatives, calculators, etc.).</td>
</tr>
<tr>
<td><strong>Explore:</strong> Students work on the task with their partner or in small groups. Here the teacher’s role is to pose questions to support task exploration and to elicit student thinking.</td>
</tr>
<tr>
<td><strong>Discuss:</strong> The class comes together to discuss the problem, with a focus on solution strategies. The teacher may select a main focus based on observations and facilitates the discussion. Teacher may then instruct students as needed.</td>
</tr>
<tr>
<td><strong>Follow-Up Activities:</strong> Students continue to work on the concept throughout the remainder of the lesson with activities, math games, and small group work. The teacher can also work with small groups for differentiated needs.</td>
</tr>
</tbody>
</table>
My Cookies!

In this lesson, students compare sets and make equal sets. The lesson should be facilitated at the beginning of a unit on comparing sets once students have been exposed to comparison vocabulary (more, less, greater, fewer).

Lesson may be repeated with amounts closer in range, making it trickier to compare (i.e., 9 & 10).

NOTE: This lesson has two cycles of Launch-Explore-Discuss, which may be done over 1-2 days.

NC Mathematics Standard:
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.

Supporting Standard
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.
- 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.

Standards for Mathematical Practice:
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision

Student Outcomes:
- I can use matching to compare two sets of objects.
- I can use counting to compare two sets of objects.
- I can make equal sets.

Math Language:
- More/greater, less/fewer, equal/same amount as

Materials:
- projection equipment (document camera or laptop and projector)
- My Cookies! Booklet on page 4
Explore (PART 2):

6. Allow 5 minutes for students to grapple with today’s task independently.

<table>
<thead>
<tr>
<th>Observation</th>
<th>Questions to Ask</th>
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<tr>
<td>Student does not know how to start the task.</td>
<td>How many total cookies do we have? (8)</td>
</tr>
<tr>
<td></td>
<td>How can you use manipulatives to show this?</td>
</tr>
<tr>
<td></td>
<td>How can we share these between Jackson and Reagan?</td>
</tr>
<tr>
<td>Student represents the original sets, but does not know how to share them.</td>
<td>How many total cookies do we have? (8)</td>
</tr>
<tr>
<td></td>
<td>Right now, which set has more?</td>
</tr>
<tr>
<td></td>
<td>How can we move the cookies around so that both sets are equal?</td>
</tr>
<tr>
<td>Student represents the original sets, then moves one cookie at a time until both sets match / both sets are equal.</td>
<td>How many cookies does each child get?</td>
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<tr>
<td></td>
<td>How can you check to see if both sets are equal?</td>
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<td></td>
<td>How can you record your work using a picture or numbers?</td>
</tr>
<tr>
<td>Student counts out 8 cookies, then gives each child one cookie at a time until there are no cookies left.</td>
<td>How many cookies does each child get?</td>
</tr>
<tr>
<td></td>
<td>How can you line up the sets to make sure they are equal?</td>
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<tr>
<td></td>
<td>Example of lining up/matching:</td>
</tr>
<tr>
<td></td>
<td>![Example of lining up/matching]</td>
</tr>
<tr>
<td></td>
<td>How can you record your work using a picture or numbers?</td>
</tr>
</tbody>
</table>

7. As students work, select a few to share their solution strategies during the “Discuss” section of the lesson. Determine a sequence in which students will share (e.g., strategies that are related and can be compared).
Kindergarten Number Talks
Second Quarter

Overview

What is a Number Talk?
A Number Talk is a brief routine (about 10 minutes) focused around developing flexibility and fluency with numbers. Through regular opportunities to work with dot images and expressions, students develop an understanding of number relationships and structure. This supports the development of early fluency skills.

Through frequent Number Talks, students will recognize:
- Numbers are composed of smaller numbers.
- Numbers can be decomposed and combined with other numbers in a variety of ways.
- What we know about one number can help us work with other numbers.
- What we know about small numbers can help us work with large numbers.
- Numbers are organized into groups of ones, tens, hundreds, etc...

How Do Number Talks Look in Kindergarten?
During much of Kindergarten, Number Talks utilize dot images, ten frames, and Rekenreks. Later in the school year, they focus around expressions. Kindergarten students work with these quick images to find “how many”. The image is briefly displayed for three seconds, encouraging students to use strategies other than counting all to find the total quantity. At first, kindergarten students may rely solely on counting all dots to find the quantity. Through frequent experiences, they begin to rely on perceptual subitizing (instantly seeing the amount), conceptual subitizing (seeing parts within the set, and using mental processes to find the total quantity), and known number facts.
Teacher Information

Ten Frames: Flexibility with 6

General Information:
Ten frames can be used to show decompositions of a quantity, build fluency, subitize, and develop and understanding of conservation (a quantity can be represented in more than one way). These skills are the foundation to computational fluency with addition and subtraction.

Probing Questions:
- How many dots do you see?
- How did you find the amount of dots?
- Could you find how many dots there are without counting them one by one?
- How did knowing the dots on the top row, help you find the total number of dots? (i.e., when looking at second ten frame of 6, how did this help you find the total number of dots? (i.e., when looking at the third ten frame of 6)

Corresponding Number Talks are on slides 7-9.

Number Talk A:
Questions About the Frameworks or Unpacking Documents

Please send questions about:

• The instructional framework to Katie Schwartz at ECU schwartzca@ecu.edu

• Unpacking or Standards to Denise Schultz at NCDPI Denise.Schulz@dpi.nc.gov
NCCTM’s Top of the Hour Talks:
(Presentation Area at Back of Exhibit Hall)
Friday- 9:00-9:20 K-2 Tools4Teachers Writer Q&A
Friday- 12:00-12:20 Getting Started with Number Talks

Contact Us:
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Carol Midgett, midgettcarol9@gmail.com