North Carolina Department of Public Instruction
INSTRUCTIONAL SUPPORT TOOLS
FOR ACHIEVING NEW STANDARDS

K Grade Mathematics ● Unpacked Content

For the new Common Core standards that will be effective in all North Carolina schools in the 2012-13 school year.

This document is designed to help North Carolina educators teach the Common Core (Standard Course of Study). NCDPI staff are continually updating and improving these tools to better serve teachers.

What is the purpose of this document?
To increase student achievement by ensuring educators understand specifically what the new standards mean a student must know, understand and be able to do.

What is in the document?
Descriptions of what each standard means a student will know, understand and be able to do. The "unpacking" of the standards done in this document is an effort to answer a simple question "What does this standard mean that a student must know and be able to do?" and to ensure the description is helpful, specific and comprehensive for educators.

How do I send Feedback?
We intend the explanations and examples in this document to be helpful and specific. That said, we believe that as this document is used, teachers and educators will find ways in which the unpacking can be improved and made ever more useful. Please send feedback to us at feedback@dpi.state.nc.us and we will use your input to refine our unpacking of the standards. Thank You!

Just want the standards alone?
You can find the standards alone at http://corestandards.org/the-standards

Mathematical Vocabulary is identified in bold print. These are words that students should know and be able to use in context.

Counting and Cardinality K.CC

Common Core Standard and Cluster

Know number names and the count sequence.

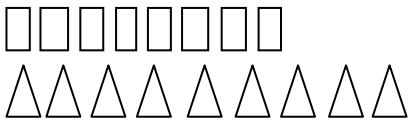
Common Core Standard	Unpacking What do these standards mean a child will know and be able to do?
K.CC.1 Count to 100 by ones and by tens.	**K.CC.1** calls for students to rote count by starting at one and count to 100. When students count by tens they are only expected to master counting on the decade (0, 10, 20, 30, 40 …). This objective does not require recognition of numerals. It is focused on the rote number sequence.
K.CC.2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1).	**K.CC.2** includes numbers 0 to 100. This asks for students to begin a rote forward counting sequence from a number other than 1. Thus, given the number 4, the student would count, "4, 5, 6 …" This objective does not require recognition of numerals. It is focused on the rote number sequence.
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).	**K.CC.3** addresses the writing of numbers and using the written numerals (0-20) to describe the amount of a set of objects. Due to varied development of fine motor and visual development, a reversal of numerals is anticipated for a majority of the students. While reversals should be pointed out to students, the emphasis is on the use of numerals to represent quantities rather than the correct handwriting formation of the actual numeral itself. **K.CC.3** asks for students to represent a set of objects with a written numeral. The number of objects being recorded should not be greater than 20. Students can record the quantity of a set by selecting a number card/tile (numeral recognition) or writing the numeral. Students can also create a set of objects based on the numeral presented.

Common Core Cluster	
Count to tell the number of objects. Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects and comparing sets or numerals.	
Common Core Standard	**Unpacking** What do these standards mean a child will know and be able to do?
K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.	**K.CC.4** asks students to count a set of objects and see sets and numerals in relationship to one another, rather than as isolated numbers or sets. These connections are higher-level skills that require students to analyze, to reason about, and to explain relationships between numbers and sets of objects. This standard should first be addressed using numbers 1-5 with teachers building to the numbers 1-10 later in the year. The expectation is that students are comfortable with these skills with the numbers 1-10 by the end of Kindergarten.
a. 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.	**K.CC.4a** reflects the ideas that students implement correct counting procedures by pointing to one object at a time (one-to-one correspondence) using one counting word for every object (one-to-one tagging/synchrony), while keeping track of objects that have and have not been counted.. This is the foundation of counting.
b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.	**K.CC.4b** calls for students to answer the question "How many are there?" by counting objects in a set and understanding that the last number stated when counting a set (…8, 9, **10**) represents the total amount of objects: "There are **10** bears in this pile." (cardinality). It also requires students to understand that the same set counted three different times will end up being the same amount each time. Thus, a purpose of keeping track of objects is developed. Therefore, a student who moves each object as it is counted recognizes that there is a need to keep track in order to figure out the amount of objects present. While it appears that this standard calls for students to have conservation of number, (regardless of the arrangement of objects, the quantity remains the same), conservation of number is a developmental milestone of which some Kindergarten children will not have mastered. The goal of this objective is for students to be able to count a set of objects; regardless of the formation those objects are placed.
c. Understand that each successive number name refers to a quantity that is one larger.	**K.CC.4c** represents the concept of "one more" while counting a set of objects. Students are to make the connection that if a set of objects was increased by one more object then the number name for that set is to be increased by one as well. Students are asked to understand this concept with and without objects. For example, after counting a set of 8 objects, students should be able to answer the question, "How many would there be if we added one more object?"; and answer a similar question when not using objects, by asking hypothetically, "What if we have 5 cubes and added one more. How many cubes would there be then?" This concept should be first taught with numbers 1-5 before building to numbers 1-10. Students should be expected to be comfortable with this skill with numbers to 10 by the end of Kindergarten.

K.CC.5 Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.	**K.CC.5** addresses various counting strategies. Based on early childhood mathematics experts, such as Kathy Richardson, students go through a progression of four general ways to count. These counting strategies progress from least difficult to most difficult. First, students move objects and count them as they move them. The second strategy is that students line up the objects and count them. Third, students have a scattered arrangement and they touch each object as they count. Lastly, students have a scattered arrangement and count them by visually scanning without touching them. Since the scattered arrangements are the most challenging for students, K.CC.5 calls for students to only count 10 objects in a scattered arrangement, and count up to 20 objects in a line, rectangular array, or circle. Out of these 3 representations, a line is the easiest type of arrangement to count.

Common Core Cluster

Compare numbers.

Common Core Standard	Unpacking What do these standards mean a child will know and be able to do?
K.CC.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.[1] [1]Include groups with up to ten objects.	**K.CC.6** expects mastery of up to ten objects. Students can use matching strategies (Student 1), counting strategies or equal shares (Student 3) to determine whether one group **is greater than**, **less than**, or **equal to** the number of objects in another group (Student 2). Student 1 I lined up one square and one triangle. Since there is one extra triangle, there are more triangles than squares.  Student 2 I counted the squares and I got 8. Then I counted the triangles and got 9. Since 9 is bigger than 8, there are more triangles than squares. Student 3 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 of the shapes away, there was still a triangle left. That means that there are more triangles than squares.
K.CC.7 Compare two numbers between 1 and 10 presented as written numerals.	**K.CC.7** calls for students to apply their understanding of numerals 1-10 to compare one from another. Thus, looking at the numerals 8 and 10, a student must be able to recognize that the numeral 10 represents a larger amount than the numeral 8. Students should begin this standard by having ample experiences with sets of objects (K.CC.3 and K.CC.6) before completing this standard with just numerals. Based on early childhood research, students should not be expected to be comfortable with this skill until the end of Kindergarten.

Operations and Algebraic Thinking K.0A

Common Core Standard and Cluster

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

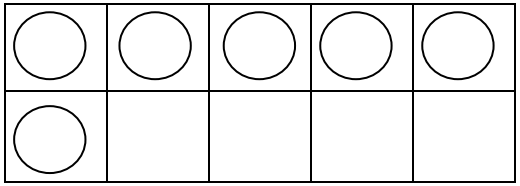
All standards in this cluster should only include numbers through 10

Students will model simple joining and separating situations with sets of objects, or eventually with equations such as 5 + 2 = 7 and 7 – 2 = 5. (Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required.) Students choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away.

Common Core Standard	Unpacking What do these standards mean a child will know and be able to do?
K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings[2], sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. [2]Drawings need not show details, but should show the mathematics in the problem. (This applies wherever drawings are mentioned in the Standards.)	**K.OA.1** asks students to demonstrate the understanding of how objects can be joined (addition) and separated (subtraction) by representing addition and subtraction situations in various ways. This objective is primarily focused on understanding the concept of addition and subtraction, rather than merely reading and solving addition and subtraction number sentences (equations).
K.OA.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.	**K.OA.2** asks students to solve problems presented in a story format (context) with a specific emphasis on using objects or drawings to determine the solution. This objective builds upon their understanding of addition and subtraction from K.OA.1, to solve problems. Once again, numbers should not exceed 10. Teachers should be cognizant of the three types of problems. There are three types of addition and subtraction problems: Result Unknown, Change Unknown, and Start Unknown. These types of problems become increasingly difficult for students. Research has found that Result Unknown problems are easier than Change and Start Unknown problems. Kindergarten students should have experiences with all three types of problems. The level of difficulty can be decreased by using smaller numbers (up to 5) or increased by using larger numbers (up to 10). Please see Appendix, Table 1 for additional examples.

<table>
<tr><td></td><td>Addition Examples:
<table>
<tr><td><u>Result Unknown:</u> There are 3 students on the playground. Four more students showed up. How many students are there now?
(3+4 = __)</td><td><u>Change Unknown</u>: There are 3 students on the playground. Some more students show up. There are now 7 students. How many students came?
(3+ __ = 7)</td><td><u>Start Unknown:</u> There are some students on the playground. Four more students came. There are now 7 students. How many students were on the playground at the beginning?
(__ + 4 = 7)</td></tr>
</table></td></tr>
<tr><td>K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).</td><td>K.OA.3 asks students to understand that a set of (5) object can be broken into two sets (3 and 2) and still be the same total amount (5). In addition, this objective asks students to realize that a set of objects (5) can be broken in multiple ways (3 and 2; 4 and 1). Thus, when breaking apart a set (decomposing), students develop the understanding that a smaller set of objects exists within that larger set (inclusion). This should be developed in context before moving into how to represent decomposition with symbols (+, -, =).

Example:
“Bobby Bear is missing 5 buttons on his jacket. How many ways can you use blue and red buttons to finish his jacket? Draw a picture of all your ideas.
Students could draw pictures of:
4 blue and 1 red button
3 blue and 2 red buttons
2 blue and 3 red buttons
1 blue and 4 red buttons
After the students have had numerous experiences with decomposing sets of objects and recording with pictures and numbers, the teacher eventually makes connections between the drawings and symbols:5=4+1, 5=3+2, 5=2+3, and 5=1+4
The number sentence only comes after pictures or work with manipulatives, and students should never give the number sentence without a mathematical representation.</td></tr>
<tr><td>K.OA.4 For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.</td><td>KOA.4 builds upon the understanding that a number can be decomposed into parts (K.OA.3). Once students have had experiences breaking apart ten into various combinations, this asks students to find a missing part of 10.
Example:
“A full case of juice boxes has 10 boxes. There are only 6 boxes in this case. How many juice boxes are missing?
<table>
<tr><td>Student 1:
Using a Ten-Frame
I used 6 counters for the 6 boxes of juice still in the case. There are 4 blank spaces,</td><td>Student 2:
Think Addition
“I counted out 10 cubes because I knew there needed to be ten. I</td><td>Student 3:
Basic Fact
I know that it’s 4 because 6 and 4 is</td></tr>
</table></td></tr>
</table>

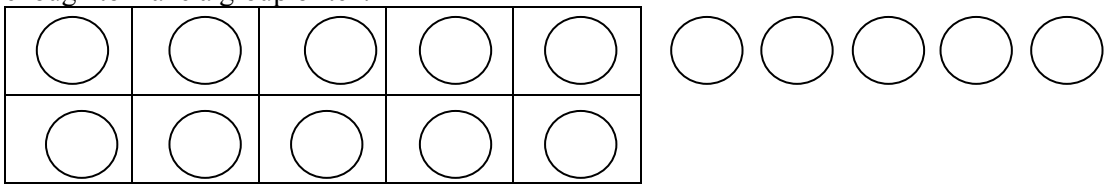
	so 4 boxes have been removed. This makes sense since 6 and 4 more equals 10. 	pushed these 6 over here because they were in the container. These are left over. So there's 4 missing."	the same amount as 10.
K.OA.5 Fluently add and subtract within 5.	**K.OA.5** uses the word fluently, which means accuracy (correct answer), efficiency (a reasonable amount of steps), and flexibility (using strategies such as the distributive property). Fluency is developed by working with many different kinds of objects over an extended amount of time. This objective does not require students to instantly know the answer. Traditional flash cards or timed tests have not been proven as effective instructional strategies for developing fluency.		

Number and Operations in Base Ten — K.NBT

Common Core Standard and Cluster

Work with numbers 11–19 to gain foundations for place value.

Common Core Standard	Unpacking What do these standards mean a child will know and be able to do?
K.NBT.1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	**K.NBT.1** is the first time that students move beyond the number 10 with representations, such as objects (manipulatives) or drawings. The spirit of this standard is that students separate out a set of 11-19 objects into a group of ten objects with leftovers. This ability is a pre-cursor to later grades when they need to understand the complex concept that a group of 10 objects is also one ten (unitizing). Ample experiences with ten frames will help solidify this concept. Research states that students are not ready to unitize until the end of first grade. Therefore, this work in Kindergarten lays the foundation of composing tens and recognizing leftovers. Example: Teacher: "Please count out 15 chips." Student: Student counts 15 counters (chips or cubes). Teacher: "Do you think there is enough to make a group of ten chips? Do you think there might be some chips leftover?" Student: Student answers. Teacher: "Use your counters to find out." Student: Student can either fill a ten frame or make a stick of ten connecting cubes. They answer, "There is

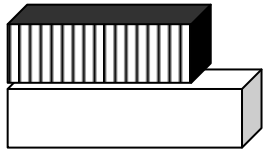
	enough to make a group of ten."  Teacher: How many leftovers do you have? Student: Students say, "I have 5 left over." Teacher: How could we use words and/or numbers to show this? Student: Students might say "Ten and five is the same amount as 15", "15 = 10 + 5"

Measurement and Data K.MD

Common Core Standard and Cluster

Describe and compare measurable attributes.

Common Core Standard	Unpacking What do these standards mean a child will know and be able to do?
K.MD.1 Describe measurable attributes of objects, such as **length** or **weight**. Describe several measurable attributes of a single object.	**K.MD.1** calls for students to describe measurable attributes of objects, such as **length**, **weight**, size. For example, a student may describe a shoe as "This shoe is **heavy**! It's also really **long**." This standard focuses on using descriptive words and does not mean that students should sort objects based on attributes. Sorting appears later in the Kindergarten standards.
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. *For example, directly compare the heights of two children and describe one child as **taller/shorter**.*	**K.MD.2** asks for direct comparisons of objects. Direct comparisons are made when objects are put next to each other, such as two children, two books, two pencils. For example, a student may line up two blocks and say, "This block is a lot longer than this one." Students are not comparing objects that cannot be moved and lined up next to each other. Through ample experiences with comparing different objects, children should recognize that objects should be matched up at the end of objects to get accurate measurements. Since this understanding requires conservation of length, a developmental milestone for young children, children need multiple experiences to move beyond the idea that …. "Sometimes this block is **longer than** this one and sometimes it's **shorter** (depending on how I lay them side by side) and that's okay." "This block is always longer than this block (with each end lined up appropriately)." Before conservation of length: The striped block is longer than the plain block when they are lined up like this.

	But when I move the blocks around, sometimes the plain block is longer than the striped block.  After conservation of length: I have to line up the blocks to measure them. The plain block is always longer than the striped block. 

Common Core Cluster	
Classify objects and count the number of objects in each category.	
Common Core Standard	**Unpacking** What do these standards mean a child will know and be able to do?
K.MD.3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. *(Limit category counts to be less than or equal to 10)*	**K.MD.3** asks students to identify similarities and differences between objects (e.g., size, color, shape) and use the identified attributes to **sort** a collection of objects. Once the objects are sorted, the student counts the amount in each set. Once each set is counted, then the student is asked to sort (or group) each of the sets by the amount in each set. For example, when given a collection of buttons, the student separates the buttons into different piles based on color (all the blue buttons are in one pile, all the orange buttons are in a different pile, etc.). Then the student counts the number of buttons in each pile: blue (5), green (4), orange (3), purple (4). Finally, the student organizes the groups by the quantity in each group (Orange buttons (3), Green buttons next (4), Purple buttons with the green buttons because purple also had (4), Blue buttons last (5). This objective helps to build a foundation for data collection in future grades. In later grade, students will transfer these skills to creating and analyzing various graphical representations.

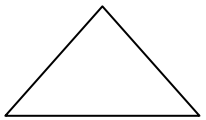
Geometry K.G

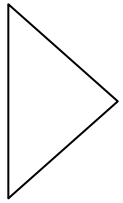
Common Core Standard and Cluster

Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

This entire cluster asks students to understand that certain attributes define what a shape is called (number of sides, number of angles, etc.) and other attributes do not (color, size, orientation). Then, using geometric attributes, the student identifies and describes particular shapes listed above. Throughout the year, Kindergarten students move from informal language to describe what shapes look like (e.g., "That looks like an ice cream cone!") to more formal mathematical language (e.g., "That is a triangle. All of its sides are the same length"). In Kindergarten, students need ample experiences exploring various forms of the shapes (e.g., size: big and small; types: triangles, equilateral, isosceles, scalene; orientation: rotated slightly to the left, 'upside down') using geometric vocabulary to describe the different shapes. In addition, students need numerous experiences comparing one shape to another, rather than focusing on one shape at a time. This type of experience solidifies the understanding of the various attributes and how those attributes are different- or similar- from one shape to another.

Students in Kindergarten typically recognize figures by appearance alone, often by comparing them to a known example of a shape, such as the triangle on the left. For example, students in Kindergarten typically recognize that the figure on the left as a triangle, but claim that the figure on the right is not a triangle, since it does not have a flat bottom. The properties of a figure are not recognized or known. Students make decisions on identifying and describing shapes based on perception, not reasoning.





Common Core Standards	Unpacking What do these standards mean a child will know and be able to do?
K.G.1 Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as ***above, below, beside, in front of, behind,*** and ***next to*.**	**K.G.1** expects students to use positional words (such as those italicized above) to describe objects in the environment. Kindergarten students need to focus first on location and position of two-and-three-dimensional objects in their classroom prior to describing location and position of two-and-three-dimension representations on paper.
K.G.2 Correctly name shapes regardless of their orientations or overall size.	**K.G.2** addresses students' identification of shapes based on known examples. Students at this level do not yet recognize triangles that are turned upside down as triangles, since they don't "look like" triangles. Students need ample experiences looking at and manipulating shapes with various typical and atypical orientations. Through these experiences, students will begin to move beyond what a shape "looks like" to identifying particular geometric attributes that define a shape.
K.G.3 Identify shapes as two-dimensional (lying in a plane, "**flat**") or three dimensional ("**solid**").	**K.G.3** asks students to identify flat objects (2 dimensional) and solid objects (3 dimensional). This standard can be done by having students sort flat and solid objects, or by having students describe the appearance or thickness of shapes.

Common Core Cluster	
Analyze, compare, create, and compose shapes.	
Common Core Standard	**Unpacking** What do these standards mean a child will know and be able to do?
K.G.4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of **sides** and vertices/"**corners**") and other attributes (e.g., having sides of **equal** length).	**K.G.4** asks students to note similarities and differences between and among 2-D and 3-D shapes using informal language. These experiences help young students begin to understand how 3-dimensional shapes are composed of 2-dimensional shapes (e.g.., The base and the top of a cylinder is a circle; a circle is formed when tracing a sphere).
K.G.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.	**K.G.5** asks students to apply their understanding of geometric attributes of shapes in order to create given shapes. For example, a student may roll a clump of play-doh into a sphere or use their finger to draw a triangle in the sand table, recalling various attributes in order to create that particular shape.
K.G.6 Compose simple shapes to form larger shapes. For example, "Can you join these two triangles with full sides touching to make a rectangle?"	**K.G.6** moves beyond identifying and classifying simple shapes to manipulating two or more shapes to create a new shape. This concept begins to develop as students' first move, rotate, flip, and arrange puzzle pieces. Next, students use their experiences with puzzles to move given shapes to make a design (e.g., "Use the 7 tangram pieces to make a fox."). Finally, using these previous foundational experiences, students manipulate simple shapes to make a new shape.