

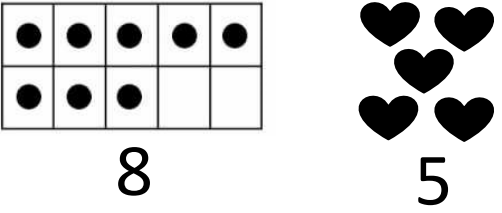
# MATHEMATICS

UTAH CORE **GUIDES** Kindergarten

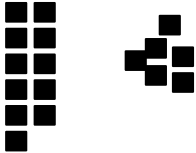


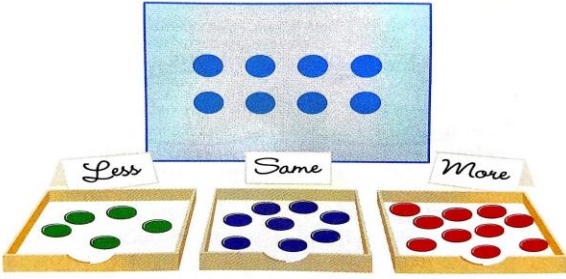
Know number names and the counting sequence (Standards K.CC.1–3)	
<b>Standard K.CC.1.</b> Count to 100 by ones and by tens.	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>• Understand there is an ordered sequence of counting numbers</li> <li>• Say counting numbers in the correct sequence from 1 to 10</li> <li>• Say counting numbers in the correct sequence from 1 to 20 attending to how teen numbers are worded (see teacher note below)</li> <li>• Say counting numbers in the correct sequence from 1 to 100 attending to the patterns of increasing by ones and tens (decade numbers)</li> <li>• Say decade counting numbers in the correct sequence from 10 to 100</li> </ul> <p>Teacher note: This standard does not require students to read or write numerals, only to verbalize them. While this standard only addresses rote counting, students may count along a number line to support standard K.CC.3.</p> <p>“Essentially, English-speaking children have to memorize the number names for numbers from 1 to 12. The teen numbers (13–19) have roots in the numbers from 3 to 9, which can provide some support for learning them, but there are quirks in the language. <i>Fourteen, sixteen, seventeen, eighteen, and nineteen</i> essentially add <i>teen</i> (standing for <i>ten</i>) onto <i>four, six, seven, eight, and nine</i>. But <i>thirteen</i> and <i>fifteen</i> are a little different. As a consequence, some children may say “fiveteen” instead of “fifteen.” Interestingly, this seems to represent an attempt to make some sense of the counting sequence and may be made by children who have some insight at least into the patterns represented by the counting sequence and are trying to make sense of counting rather than just memorize a rote sequence of meaningless words. ...</p> <p>After 20, things start to make more sense and generative rules can be applied. To count beyond 20, children, need only to apply their knowledge of counting from 1 to 9 for the numbers between decade numbers (20, 30, 40, and so on). The most likely place for errors to occur is when the count gets to a new decade (<i>thirty-ten</i> rather than <i>forty</i>). As with the teens, twenty has only a slight resemblance to two, and thirty and fifty are marginally related to three and five. The other decade numbers incorporate the corresponding number names of numbers less than 10, but <i>-ty</i> (as in <i>sixty</i>) is used in place of <i>ten</i>. There is a pattern, but the language does not clearly support the conceptual notion of groups on ten.” (Carpenter, T. P., Franke, M. L., Johnson, N.C., Turrou, A. C., &amp; Wager, A. A. (2016). <i>Young children’s mathematics: Cognitively guided instruction in early childhood education</i>. Portsmouth, NH: Heinemann. pp. 10–12)</p>	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
<b>K.CC.2</b> Count forward beginning with a number other than one <b>K.CC.4</b> Understand the relationship between numbers and quantities	<b>1.NBT.1</b> Count to 120 beginning with any number; read and write numerals and represent numbers with objects within this range <b>1.NBT.2</b> Understand that two-digit numbers represent amounts of tens and ones <b>2.NBT.2</b> Count within 1,000; skip-count by fives, tens, and hundreds
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>• Students may or may not have pre-kindergarten experience counting from 1–20 or beyond</li> </ul>	
Academic Vocabulary	
count, after, next, ones, tens, decade numbers (10, 20, 30, 40, 50, 60, 70, 80, 90, 100), number names from 1 to 100	
Suggested Models	Suggested Strategies
To count beyond twenty, students may use their understanding of decade numbers and ones to recognize and continue the pattern of counting to 100. For example, a child may say, “I know that after the teen numbers, I can use decade numbers to continue the pattern, so ‘twenty-one,’ ‘twenty-two,’ ‘twenty-three,’ ...”	<ul style="list-style-type: none"> <li>• Use a variety of nursery rhymes and number songs to help associate number sequence with familiar situations (“One, two, buckle my shoe,” “One potato, two potato,” etc.)</li> <li>• Use kinesthetic and/or auditory cues while counting (clapping, jumping, whistles, etc.)</li> <li>• Count along a number line</li> <li>• Count along a hundreds chart</li> <li>• Integrate counting with calendar routines</li> </ul>

Know number names and the counting sequence (Standards K.CC.1–3)	
<b>Standard K.CC.2.</b> Count forward beginning from a given number within the known sequence (instead of having to begin at 1).	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>Understand there is an ordered sequence of counting numbers</li> <li>Say counting numbers in the correct sequence between 1 and 100, beginning at any number other than one</li> </ul>	
<p>Teacher note: This standard does not require students to read or write numerals, only to verbalize them.</p> <p>“Counting must be done by saying the number names in a fixed order. Thus, children not only need to learn the number names, they also need to understand the principle that counting numbers appear in a fixed sequence. They also need to understand that numbers are not repeated in the counting sequence, and they have to learn the specific order of number names in that sequence. Young children may learn some of these features of counting before others. For example, some children may learn some number names, but not understand that the numbers follow a sequence. Other children may understand that numbers should follow a fixed sequence but not know what the correct sequence is.” (Carpenter, T. P., Franke, M. L., Johnson, N.C., Turrou, A. C., &amp; Wager, A. A. (2016). <i>Young children’s mathematics: Cognitively guided instruction in early childhood education</i>. Portsmouth, NH: Heinemann. p. 9)</p>	
Related Standards: Current Grade Level	Related Standards: Future Grade Level
<b>K.CC.1</b> Count to 100 by ones and by tens <b>K.CC.4</b> Understand the relationship between numbers and quantities	<b>1.NBT.1</b> Count to 120 beginning with any number; read and write numerals and represent numbers with objects within this range <b>1.OA.5</b> Relate counting to addition and subtraction <b>1.OA.6</b> Add and subtract within 20 using strategies such as counting on <b>2.OA.2</b> Fluently add and subtract within 20 using mental strategies such as counting on <b>2.NBT.2</b> Count within 1,000; skip-count by fives, tens, and hundreds
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>Say counting numbers in the correct sequence from 1 to 20 attending to how teen numbers are worded (see teacher notes on K.CC.1)</li> <li>Say counting numbers in the correct sequence from 1 to 100 attending to the patterns of increasing by ones and tens (K.CC.1)</li> </ul>	
Academic Vocabulary	
count, after, next, ones, counting on, number names from 1 to 100	
Suggested Models	Suggested Strategies
<p>To count beyond twenty, students may use their understanding of decade numbers and ones to recognize and continue the pattern of counting to 100. For example, a child may say, “I know that after the teen numbers, I can use decade numbers to continue the pattern, so ‘twenty-one,’ ‘twenty-two,’ ‘twenty-three,’ ...”</p> <p>43, 44, __, __, __...</p>	<ul style="list-style-type: none"> <li>Use kinesthetic and/or auditory cues while counting (clapping, jumping, whistles, etc. For example: Students start counting from three and clap on the decade numbers)</li> <li>Teacher supports counting by beginning the sequence for the students to provide the first few numbers (For example, if a child does not know what comes after “thirteen,” the teacher prompts, “ten, eleven, twelve, thirteen”)</li> <li>Extend understanding by orally counting on from a given number to a target number</li> <li>Count along a number line</li> <li>Count along with a hundreds chart</li> <li>Integrate counting with calendar routines</li> </ul>

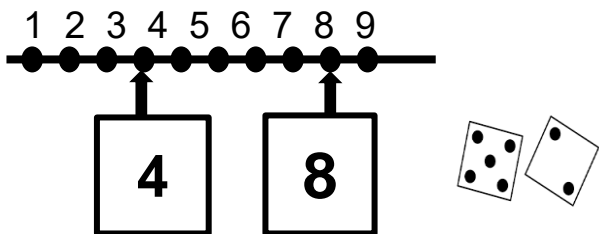
Know number names and the counting sequence (Standards K.CC.1–3)	
<b>Standard K.CC.3.</b> Read and write numbers using base ten numerals from 0 to 20. Represent a number of objects with a written numeral, in or out of sequence (0 represents a count of no objects).	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>Recognize and write numerals 0 - 20</li> <li>Recognize that 0 represents a count of no objects</li> <li>Represent a number of objects with a written numeral, not necessarily counting to name the quantity</li> </ul> <p>Teacher Note: “Due to varied development of fine motor and visual development, reversal of numerals is anticipated. While the 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 formations of the actual numeral itself.” (<a href="http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/kindergarten.pdf">http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/kindergarten.pdf</a> p. 5)</p> <p>“Helping children read and and write the 10 single-digit numerals is similar to teaching them to read and write letters of the alphabet. Neither has anything to do with number concepts. Numeral writing does not have to be repetitious practice, but it can be engaging.” (Van de Walle, J. A, Karp, K., &amp; Bay-Williams, J. M. (2013). Elementary and middle school mathematics : teaching developmentally. 8th ed. / Boston: Pearson. pp. 132-133)</p>	
Related Standards: Current Grade Level	Related Standards: Future Grade Level
<p><b>K.CC.1</b> Count to 100 by ones</p> <p><b>K.CC.4</b> Understand the relationship between numbers and quantities; connect counting to cardinality</p> <p><b>K.CC.5</b> Use counting to answer questions about “how many”</p> <p><b>K.CC.7</b> Compare two numbers 1–10 represented as written numerals</p>	<p><b>1.NBT.1</b> Count to 120 beginning with any number; read and write numerals and represent numbers with objects within this range</p> <p><b>2.NBT.3</b> Read and write numbers to 1,000 using base-ten numerals, number names, and expanded form</p>
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>Use a writing tool to reproduce or trace a given shape</li> </ul>	
Academic Vocabulary	
number, numeral, number names zero to twenty, count, represent, write	
Suggested Models	Suggested Strategies
<p>Match a counted set of objects with a numeral</p> 	<ul style="list-style-type: none"> <li>Write/reproduce numerals in the air, in sand, in clay, on whiteboards, etc.</li> <li>Use the calculator for numeral recognition and to develop familiarity with numerals</li> <li>Practice writing the numerals from 0 to 20 in sequential and random order after teacher modeling</li> <li>Move between number names, numerals, and pictured sets</li> <li>Identify a number between 1 and 20 on a number line or hundreds chart, then reproduce that number</li> <li>Lead the class to count the objects in a set, then instruct the students to write the number of objects counted</li> <li>Have student roll a dot or number die and then record the number on paper (roll and write)</li> </ul>

Count to tell the number of objects (Standards K.CC. 4–5)	
<p><b>Standard K.CC.4.</b> Understand the relationship between numbers and quantities; connect counting to cardinality.</p> <p><b>a.</b> When counting objects, say the numbers in the standard order. Pair each quantity of objects with one and only one number, and each number with the correct quantity of objects.</p> <p><b>b.</b> Understand that the last number said represents the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.</p> <p><b>c.</b> Understand that each successive number refers to a quantity that is one greater than the previous number.</p>	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>● Attend to one-to-one correspondence</li> <li>● Count in the correct sequence as objects are tagged</li> <li>● Count to name the total amount of the set</li> <li>● Know the last object counted names the number of objects in a set</li> <li>● Count in a way that all objects are included in the count (straight lines of objects are easier to count; however, over time students learn to keep track of items in a variety of patterns)</li> <li>● Understand and state how many objects there would be if the set was increased by one</li> <li>● Understand the number of objects in a set remains constant regardless of their arrangement or the order of the count</li> </ul>	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
<p><b>K.CC.1</b> Count to 100 by ones</p> <p><b>K.CC.2</b> Count forward beginning from a given number</p> <p><b>K.CC.3</b> Read and write numerals 0 to 20</p> <p><b>K.CC.5</b> Use counting to answer questions about “how many”</p> <p><b>K.CC.6</b> Use matching or counting strategies to compare groups of objects</p>	<p><b>1.NBT.1</b> Count to 120 beginning with any number; read and write numerals and represent numbers with objects within this range</p> <p><b>1.OA.5</b> Relate counting to addition and subtraction</p> <p><b>1.OA.6a</b> Add and subtract within 20 using strategies such as counting on</p> <p><b>2.OA.2a</b> Fluently add and subtract within 20 using mental strategies such as counting on</p> <p><b>2.NBT.2</b> Count within 1,000; skip-count by fives, tens, and hundreds</p>
Critical Background Knowledge	
● See Related Standards: Current Grade Level	
Academic Vocabulary	
set, numeral, number, number names zero to twenty, quantity, greater, more, last, count on, equal	
Suggested Models	Suggested Strategies
<p>The number 2 represents two objects. The number 3 represents three objects, which is one more than two. The number 4 represents four objects, which is one more than 3, etc.</p> <p>Four circles are counted. The last number said represents the total in the set.</p> <p>Each set of squares has four, despite the arrangement (in a line, array, or scattered).</p>	<ul style="list-style-type: none"> <li>● Move objects that have already been counted to keep track (color, slide, tap, drop and move objects while counting)</li> <li>● Arrange objects into a line, array, circle, etc. and then count</li> <li>● Group objects and then count; for example, creating a group of ten and some more</li> <li>● Use tactile cards with numerals and quantity</li> <li>● Reinforce that the last number name tells the count of objects by asking, “How many are there?”</li> <li>● Have the students count out 4 counters. Add one more counter to the set and ask how many now? (5) Follow-up by doing the process again, but do not add the counter. . . ask “How many will there be if I add one more counter?”</li> <li>● Demonstrate that each successive number has a greater value by using number cards that are quantified with pictures</li> <li>● Start by counting objects that are in a straight line and then move to other arrangements to demonstrate that the number is the same regardless of the order</li> </ul>

Count to tell the number of objects (Standards K.CC. 4–5)	
<b>Standard K.CC.5.</b> Use counting to answer questions about “how many.” <i>For example, 20 or fewer objects arranged in a line, a rectangular array, or circle; 10 or fewer objects in a scattered configuration. Using a number from 1–20, count out that many objects.</i>	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>Count how many objects are in a given set from 1–20 in a variety of ways such as a line, an array or scattered pattern</li> <li>Count out a given number of objects from a larger set</li> <li>Given a numeral 1–20, a student can count out a set to match the given numeral</li> <li>The number of objects in a set remains constant regardless of their arrangement or the order of the count</li> </ul>	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
<b>K.CC.1</b> Count to 100 by ones and by tens <b>K.CC.2</b> Count forward beginning from a given number <b>K.CC.4</b> Understand the relationship between numbers and quantities <b>K.CC.6</b> Use matching or counting strategies to compare groups of objects	<b>1.OA.5</b> Relate counting to addition and subtraction <b>1.OA.6</b> Add and subtract within 20 using strategies such as counting on <b>1.NBT.1</b> Count to 120 beginning with any number; read and write numerals and represent numbers with objects within this range <b>2.OA.2</b> Fluently add and subtract within 20 using mental strategies such as counting on <b>2.NBT.2</b> Count within 1,000; skip-count by fives, tens, and hundreds
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>Rote count to 20 by ones (K.CC.1)</li> <li>Use one-to-one correspondence (K.CC.4)</li> <li>Understand the relationship between numbers and quantities (K.CC.4)</li> </ul>	
Academic Vocabulary	
count, set, objects, array, scattered, how many	
Suggested Models	Suggested Strategies
<ul style="list-style-type: none"> <li>Ten and twenty frames</li> <li>Pictures</li> <li>Tally marks</li> <li>Objects</li> </ul>  <p>Count sets of objects in various configurations.</p>	<ul style="list-style-type: none"> <li>Provide opportunities for students to count out a certain number of objects such as keys, pompoms, pennies, or traditional counting manipulatives, moving objects as they count</li> <li>Number Talks: Discuss and create representations with dot cards, number racks, ten frames, twenty frames, etc.</li> <li>Number of the Day: Create a set of objects from the named number</li> </ul>

Identify and compare quantities of objects and numerals (Standards K.CC.6–7).	
<b>Standard K.CC.6.</b> Use matching or counting strategies to identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group. Include groups with up to ten objects.	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>● Match objects in two different groups to identify which group has a number of objects greater than, less than, or equal to the other</li> <li>● Count objects in two different groups to identify which group has a number of objects greater than, less than, or equal to the other</li> <li>● Identify if a group of ten or less has greater than, less than, or equal quantities to another group of ten or less</li> <li>● Distinguish the difference between the meanings of <i>more</i> and <i>less</i></li> <li>● Recognize that a collection with a higher count has more things in it than a collection with a lower count</li> </ul> <p>Teacher Note: Ensure that the size of objects in each group are identical. Students should not be expected to use or recognize the <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols when comparing numbers.</p> <p>“Children have many opportunities to use the word <i>more</i>, but have limited exposure to the word <i>less</i>. To help children with the concept of <i>less</i>, frequently pair it with <i>more</i> and make a conscious effort to ask “Which is less?” questions as well as “Which is more?” questions. ... Children should construct sets using counters as well as make comparisons or choices (Which is less?) between two given sets.” (Van de Walle, J. A, Karp, K., &amp; Bay-Williams, J. M. (2013). <i>Elementary and middle school mathematics: teaching developmentally</i>. 8th ed. / Boston: Pearson. pp. 134)</p>	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
<p><b>K.CC.7</b> Compare two numbers between 1 and 10 presented as written numerals using “greater than,” “less than,” or “equal to”</p> <p><b>K.MD.2</b> Directly compare two objects with a measurable attribute in common, to see which object has “more of/less of” the attribute</p> <p><b>K.MD.3</b> Classify objects into given categories; count the numbers of objects in each category and sort by count</p>	<p><b>1.OA.1</b> Use addition and subtraction within 20 to solve word problems involving situations of comparing</p> <p><b>1.NBT.3</b> Compare two two-digit numbers using the <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols</p> <p><b>1.MD.4</b> Compare data with up to three categories by asking and answering questions about how many more or less are in one category than in another</p> <p><b>2.NBT.4</b> Compare two three-digit numbers using the <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols</p>
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>● Understand the relationship between numbers and quantities; connect counting to cardinality (K.CC.4)</li> <li>● Use counting to answer questions about “how many” (K.CC.5)</li> </ul>	
Academic Vocabulary	
compare, more, more than, most, greater, greater than, less, less than, least, fewer, fewer than, equal, same as, set, group	
Suggested Models	Suggested Strategies
	<ul style="list-style-type: none"> <li>● Line up two groups of counters parallel to each other, so that opposing partners may be matched to identify if the first group is more than, less than, or equal to the second group</li> <li>● Count two groups of objects independently to determine if the first group is more than, less than, or equal to the second group</li> <li>● Construct a group that is greater than, equal to, or less than a given group</li> <li>● Defend an answer and justify why a group contains more than, less than, or an equal amount compared to another group</li> <li>● Use 5-frames and/or 10-frames to compare two groups</li> <li>● Using 5-frames, 10-frames, or other visual representations of a set, ask students to find a classmate with either greater than, less than, or equal to their own representation</li> </ul>
Image Source: Van de Walle, J. A, Karp, K., & Bay-Williams, J. M. (2013). <i>Elementary and middle school mathematics: teaching developmentally</i> . 8th ed. / Boston: Pearson. pp. 135)	



Identify and compare quantities of objects and numerals (Standards K.CC.6–7).	
<b>Standard K.CC.7.</b> Compare two numbers between 1 and 10 presented as written numerals using “greater than,” “less than,” or “equal to.”	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>• Understand that two numerals between 1 and 10 represent quantities that can be compared</li> <li>• Compare two written numerals (1-10) using greater than, less than or equal to</li> </ul> <p>Teacher Note: Ensure that the size of objects in each group are identical. Students should not be expected to use or recognize the <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols when comparing numbers.</p> <p>“Children have many opportunities to use the word <i>more</i>, but have limited exposure to the word <i>less</i>. To help children with the concept of <i>less</i>, frequently pair it with <i>more</i> and make a conscious effort to ask “Which is less?” questions as well as “Which is more?” questions.” (Van de Walle, J. A, Karp, K., &amp; Bay-Williams, J. M. (2013). <i>Elementary and middle school mathematics: teaching developmentally</i>. 8th ed. / Boston: Pearson. pp. 134)</p>	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
<p><b>K.MD.2</b> Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute</p> <p><b>K.CC.6</b> Use matching or counting strategies to identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group</p>	<p><b>1.OA.1</b> Use addition and subtraction within 20 to solve word problems involving situations of comparing</p> <p><b>1.OA.7</b> Understand the meaning of the equal sign, and determine whether equations involving addition and subtraction are true and false</p> <p><b>1.NBT.3</b> Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparison with the symbols <math>&gt;</math>, <math>=</math>, <math>&lt;</math></p> <p><b>1.MD.4</b> Compare data with up to three categories by asking and answering questions about how many more or less are in one category than in another</p> <p><b>2.NBT.4</b> Compare two three-digit numbers using the <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols</p>
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>• Understand the relationship between numbers and quantities; connect counting to cardinality (K.CC.4)</li> <li>• Use counting to answer questions about “how many” (K.CC.5)</li> <li>• Use matching or counting strategies to identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group (K.CC.6)</li> </ul>	
Academic Vocabulary	
compare, more, more than, most, greater, greater than, less, less than, least, fewer, fewer than, equal, same as, set, group, numeral	
Suggested Models	Suggested Strategies
	<ul style="list-style-type: none"> <li>• Use a number line or hundreds chart to visually compare two numbers between 1 and 10</li> <li>• Use two number cards, dice, spinners, or number generators to compare numbers between 1 and 10 (see model to the left)</li> <li>• Quantify two numbers and compare quantities to determine which number is greatest</li> </ul>



**Additional Teacher Notes on Counting and Cardinality**

Counting Principles:

- There is an **ordered sequence of counting numbers**, and numbers are always assigned to items in a collection in the same order starting with one.
- **The one-to-one principle.** Exactly one number from the counting sequence is assigned to each item in the collection.
- **The cardinal principle.** The last number in the counting sequence assigned to the collection represents the number of objects in the collection.

(Carpenter, T. P., Franke, M. L., Johnson, N.C., Turrou, A. C., & Wager, A. A. (2016). *Young children's mathematics: Cognitively guided instruction in early childhood education*. Portsmouth, NH: Heinemann. p. 9)

- **Hierarchical Inclusion** is the idea that numbers build by exactly one each time and nest within each other by this same amount.
- **Subitize** is to perceive up to four objects without doing any mathematical thinking.

(Fosnot, C.T. & Dolk, M. (2002). *Young mathematicians at work: Constructing number sense, addition, and subtraction*. Portsmouth, NH: Heinemann Press. pp. 35–36)

“The counting principles develop concurrently and in relation to children’s experiences and existing understandings. The counting principles do not develop in a set order in the same ways for all children. This means that not all children will learn the counting sequence before understanding one-to-one correspondence or understand one-to-one correspondence before developing the cardinal principle. However, we do see that each and every child comes to preschool with some knowledge and understanding of counting. Finding out what children know requires first attending to each child and the range of counting principles and his use of counting.” (Carpenter, T. P., Franke, M. L., Johnson, N.C., Turrou, A. C., & Wager, A. A. (2016). *Young children's mathematics: Cognitively guided instruction in early childhood education*. Portsmouth, NH: Heinemann. p. 34)

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from (Standards K.OA.1–5).

**Standard K.OA.1** Represent addition and subtraction with objects, fingers, mental images, simple drawings, or sounds. *For example, use clapping, act out situations, and use verbal explanations, expressions, or equations.*

- Understand addition as putting together or the joining of two sets to create a larger set
- Understand addition as adding to or increasing the amount in a set
- Understand subtraction as taking apart or separating a larger set into two smaller sets
- Understand subtraction as taking from or decreasing the amount in a set

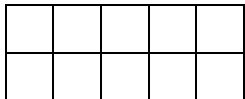
Teacher Note: This standard should be taught by providing students with interactive experiences. “Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required.” Please note that it is not until First Grade when “Understand the meaning of the equal sign” is an expectation (1.OA.7).  
(<http://www.ncpublicschools.org/docs/curriculum/mathematics/scos/kindergarten.pdf>)

<p><b>K.OA.2</b> Solve addition and subtraction word problems within 10  <b>K.OA.3</b> Decompose numbers less than or equal to 10  <b>K.OA.4</b> Make sums of ten  <b>K.OA.5</b> Add and subtract within 5</p>	<p><b>1.OA.1 – 7</b> Represent and solve problems involving addition and subtraction  <b>1.OA.2</b> Solve word problems with 3 addends  <b>1.NBT.4 - 5</b> Solve addition and subtraction problems using place value  <b>2.OA.1 – 4</b> Represent and solve problems involving addition and subtraction  <b>2.NBT.5 – 9</b> Use place value to solve addition and subtraction problems</p>
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**Critical Background Knowledge**

- Understand the relationship between numbers and quantities (K.CC.4)
- Use counting to answer questions about “how many” (K.CC.5)
- Identify whether the number of objects in one group is greater, less than, or equal to the number of objects in another group up to 10 (K.CC.6)

join, add, combine, put together, addition, plus, total, separate, equal to, subtract, difference, take away, take apart, compare, more, less

<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; width: 15%;"> <p>Dice Addition</p> <p>___ + ___ = ___</p> <p>___ + ___ = ___</p> </div> <div style="border: 1px solid black; padding: 5px; width: 15%;"> <p>Dice Subtraction</p> <p>___ - ___ = ___</p> <p>___ - ___ = ___</p> </div> <div style="text-align: center;"> <p>ten-frame</p>  </div> </div> <p>Connect visual models to physical actions and representations.</p>	<ul style="list-style-type: none"> <li>• In the context of stories relevant to the students, role play the actions of putting together, adding to, taking apart, and taking from using various models</li> <li>• Use objects, fingers, mental images, simple drawings, sounds, clapping, and acting out situations</li> <li>• Use dice, ten frames, linking cubes, etc. to practice adding and subtracting objects</li> <li>• Verbally express explanations, expressions, and equations</li> </ul>
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Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from (Standards K.OA.1–5).

**Standard K.OA.2** Solve addition and subtraction word problems within 10. Use objects or drawings to represent the problem.

- Understand each set in an addition word problem is represented by a number, and when joined together makes a larger set represented by a larger number
- Understand the set in a subtraction word problem is represented by a larger number and when separated makes two smaller sets represented by two smaller numbers
- Determine the operation based on the actions in the context of a word problem (avoid relying on key word strategies)
- Solve the following addition and subtraction situations (See: TABLE 1. Common addition and subtraction situations)

Add To Result Unknown	Take From Result Unknown	Put Together/Take Apart Total Unknown	Put Together/Take Apart Both Addends Unknown
Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now?  $2 + 3 = ?$	Five apples were on the table. I ate two apples. How many apples are on the table now?  $5 - 2 = ?$	Three red apples and two green apples are on the table. How many apples are on the table?  $3 + 2 = ?$	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase?  $5 = 0 + 5, 5 = 5 + 0$ $5 = 1 + 4, 5 = 4 + 1$ $5 = 2 + 3, 5 = 3 + 2$

Teacher Note: The commutative property of addition is introduced in first grade in 1.OA.3. Kindergarten students may recognize that interchanging addends results in the same total. This should be explored in addition and discussed in subtraction if misconceptions arise with students interchanging numbers in subtraction.

- K.OA.3** Decompose numbers less than or equal to 10
- K.OA.4** Make sums of ten using any number from 1 to 9
- K.OA.5** Fluently add and subtract using numbers within 5

- 1.OA.1** Solve addition and subtraction word problems within 20
- 1.OA.2** Solve word problems with 3 addends
- 2.OA.1** Solve addition and subtraction word problems within 100
- 2.NBT.5** Use addition and subtraction within 100 to solve word problems

Critical Background Knowledge

- Represent addition and subtraction with objects, fingers, mental images, simple drawings, or sounds (K.OA.1)
- Understand the relationship between numbers and quantities (K.CC.4)

join, add, combine, put together, addition, plus, sum, total, separate, equal to, subtract, minus, difference, take away, take apart



- Use objects, fingers, and simple drawings to represent addition and subtraction word problems
- Create word problems verbally
- Use expressions and equations (not required, but recommended)
- Use a bar model
- Part/Part/Whole; Fact Families
- Use word problems to practice adding and subtracting

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from (Standards K.OA.1–5).

**Standard K.OA.3** Decompose numbers less than or equal to 10 into pairs in more than one way by using objects or drawings. Record each decomposition by a drawing or equation. *For example,  $5 = 2 + 3$  and  $5 = 4 + 1$ .*

- Understand that a larger set can be decomposed into two smaller sets
- Decompose numbers less than or equal to 10 into pairs using objects and drawings
- Record decomposed number pairs with drawings or equations
- Understand part-part-whole relationships
- Use the addition (+) and equal sign (=) correctly when writing an equation

Teacher Note: Students develop an understanding of part-whole relationships as they recognize that a set of objects (5) can be broken into smaller sub-sets (3 and 2) and still remain the total amount (5). In addition, this standard 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 (decompose), students use the understanding that a smaller set of objects exists within that larger set (inclusion). In Kindergarten, students need ample experiences breaking apart numbers and using the vocabulary “and” & “same amount as” before symbols (+, =) and equations ( $5 = 3 + 2$ ) are introduced. If equations are used, a mathematical representation (picture, objects) needs to be present as well.

(<http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/extended-k.pdf>)

**K.OA.1** Represent addition and subtraction  
**K.OA.2** Solve addition and subtraction word problems within 10  
**K.OA.4** Make sums of ten  
**K.OA.5** Fluently add and subtract using numbers within 5  
**K.NBT.1** Compose and decompose numbers from 11-19

**1.OA.1** Use addition and subtraction to solve word problems with a variety of situations, including putting together and taking apart  
**1.OA.3** Apply properties of operations as strategies to add and subtract  
**1.OA.5** Relate counting to addition and subtraction.  
**1.OA.6** Add and subtract within 20  
**2.OA.1, 2.OA.2,** Use addition and subtraction to solve one-step and two-step word problems

Critical Background Knowledge

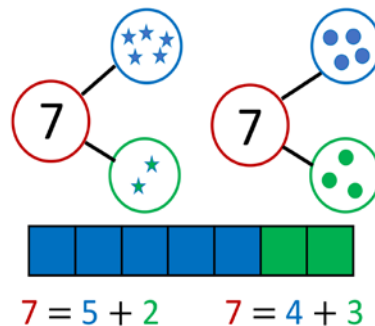
- Represent a number of objects with a written numeral (K.CC.3)
- Understand the relationship between numbers and quantities and count with one-to-one correspondence (K.CC.4, K.CC.5)

equal to, equation, expression, subtract, difference, minus, separate, decompose, total, take apart

Example:  
 Bobby Bear is missing 7 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 3 red buttons; 5 blue and 2 red buttons; 1 blue and 6 red buttons; 0 blue and 7 red buttons



- Linking cubes
- Five-frames and ten-frames
- Number bonds
- Bar models
- Two-color counters
- Songs
- Games

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from (Standards K.OA.1–5).

**Standard K.OA.4** Make sums of 10 using any number from 1 to 9. *For example,  $2 + 8 = 10$ .* Use objects or drawings to represent and record the answer.

- Make sums (totals) of 10 using any number from 1 - 9 using objects or drawing
- Understand that numbers are composed of smaller numbers
- Understand part-part-whole relationships
- Understand that two smaller sets join together to make a larger set

Teacher Note: Students build upon the understanding that a number can be decomposed into parts (K.OA.3) to find a missing part of 10. Through numerous concrete experiences, kindergarteners model the various sub-parts of ten and find the missing part of 10.

(<http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/extended-k.pdf>)

**K.OA.1** Represent addition and subtraction  
**K.OA.2** Solve addition and subtraction word problems within 10  
**K.OA.3** Decompose numbers less than or equal to 10  
**K.OA.5** Fluently add and subtract using numbers within 5  
**K.NBT.1** Compose and decompose numbers from 11-19 into tens and ones

**1.OA.1** Use addition and subtraction to solve word problems with a variety of situations  
**1.OA.3** Apply properties of operations as strategies to add and subtract  
**1.OA.4** Understand subtraction as an unknown-addend problem  
**1.OA.6** Add and subtract within 20  
**1.OA.8** Determine the unknown whole number in an equation with three numbers  
**2.OA.1, 2.OA.2,** Use addition and subtraction to solve one-step and two-step word problems  
**2.NBT.5, 2.NBT.6, 2.NBT.7** Add and subtract multi-digit numbers

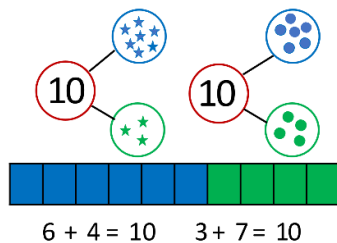
Critical Background Knowledge

- Represent a number of objects with a written numeral (K.CC.3)
- Understand the relationship between numbers and quantities (K.CC.4)
- Counting with one-to-one correspondence (K.CC.5)

add, addend, addition, equal to, equation, expression, plus, combine, put together, total

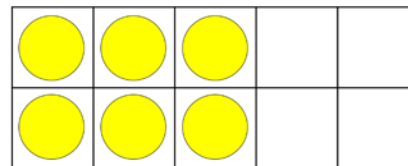
Example with Counters: When working with two-color counters, a student determines that 4 more beans are needed to make a total of 10.

“I have 6 counters. I need 4 more to make 10.”



Example Using a Ten-Frame:

“I used a ten frame for the case. Then, I put on 6 counters for juice still in the case. There is no juice in these 4 spaces. So, 4 are missing.”



- Linking cubes, counters, etc.
- Ten-frames
- Number bonds
- Bar models
- Games

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from (Standards K.OA.1–5).

**Standard K.OA.5** Fluently add and subtract using numbers within 5.

- Add and subtract using numbers within 5 (totals up to 5) fluently
- Use addition and subtraction strategies flexibly, accurately and efficiently
- Verbally answer addition and subtraction problems

Teacher Note: Oftentimes, when children think of each “fact” as an individual item that does not relate to any other “fact”, they are attempting to memorize separate bits of information that can be easily forgotten. Instead, in order to fluently add and subtract, children must first be able to see sub-parts within a number (inclusion, K.CC.4.c). Traditional flash cards or timed tests have not been proven as effective instructional strategies for developing fluency. Rather, numerous experiences with breaking apart actual sets of objects help children internalize parts of number.

(<http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/extended-k.pdf>; Burns (2000) About Teaching Mathematics; Fosnot & Dolk (2001) Young Mathematicians at Work; Richardson (2002) Assessing Math Concepts; Van de Walle & Lovin (2006) Teaching Student-Centered Mathematics Number)

<p><b>K.OA.2</b> Solve addition and subtraction word problems within 10  <b>K.OA.3</b> Decompose numbers less than or equal to 10</p>	<p><b>1.OA.6.b</b> Fluently add and subtract within 10  <b>1.OA.1, 1.OA.6, 1.NBT.4</b> Add and subtract within 20 and 100  <b>2.OA.2</b> Fluently add and subtract within 20  <b>2.NBT.5</b> Fluently add and subtract within 100</p>
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Critical Background Knowledge

- Represent addition and subtraction with models (K.OA.1)
- Understanding of the relationship between numbers and quantities (K.CC.4)
- Decompose numbers and solve add to and take away situations (K.OA.2, K.OA.3)

add, subtract, total, difference, plus, minus

<p>Fluency in each grade involves a mixture of just knowing some answers, knowing some answers from patterns (for example, adding 0 yields the same number), and knowing some answers from the use of strategies. It is important to push sensitively and encouragingly toward fluency of the designated numbers at each grade level, recognizing that fluency will be a mixture of these kinds of thinking which may differ across students.</p> <p>Numbers within five include the following facts:</p> <table style="margin-left: 40px;"> <tr> <td>0+0</td><td>1+0</td><td>2+0</td><td>3+0</td><td>4+0</td><td>5+0</td><td>0-0</td><td>1-1</td><td>2-2</td><td>3-3</td><td>4-4</td><td>5-5</td> </tr> <tr> <td>0+1</td><td>1+1</td><td>2+1</td><td>3+1</td><td>4+1</td><td></td><td>1-0</td><td>2-1</td><td>3-2</td><td>4-3</td><td>5-4</td><td></td> </tr> <tr> <td>0+2</td><td>1+2</td><td>2+2</td><td>3+2</td><td></td><td></td><td>2-0</td><td>3-1</td><td>4-2</td><td>5-3</td><td></td><td></td> </tr> <tr> <td>0+3</td><td>1+3</td><td>2+3</td><td></td><td></td><td></td><td>3-0</td><td>4-1</td><td>5-2</td><td></td><td></td><td></td> </tr> <tr> <td>0+4</td><td>1+4</td><td></td><td></td><td></td><td></td><td>4-0</td><td>5-1</td><td></td><td></td><td></td><td></td> </tr> <tr> <td>0+5</td><td></td><td></td><td></td><td></td><td></td><td></td><td>5-0</td><td></td><td></td><td></td><td></td> </tr> </table>	0+0	1+0	2+0	3+0	4+0	5+0	0-0	1-1	2-2	3-3	4-4	5-5	0+1	1+1	2+1	3+1	4+1		1-0	2-1	3-2	4-3	5-4		0+2	1+2	2+2	3+2			2-0	3-1	4-2	5-3			0+3	1+3	2+3				3-0	4-1	5-2				0+4	1+4					4-0	5-1					0+5							5-0					<ul style="list-style-type: none"> <li>• Practice targeting specific strategies, making a five for addition can be embedded in problem-solving tasks and games</li> <li>• Number lines</li> <li>• Five-frames</li> <li>• Use strategies such as counting on</li> <li>• Part/Part/Whole</li> </ul>
0+0	1+0	2+0	3+0	4+0	5+0	0-0	1-1	2-2	3-3	4-4	5-5																																																														
0+1	1+1	2+1	3+1	4+1		1-0	2-1	3-2	4-3	5-4																																																															
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**TABLE 1.** Common addition and subtraction situations.<sup>1</sup>

	Result Unknown	Change Unknown	Start Unknown
<b>Add To</b>	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now?  $2 + 3 = ?$	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two?  $2 + ? = 5$	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before?  $? + 3 = 5$
<b>Take From</b>	Five apples were on the table. I ate two apples. How many apples are on the table now?  $5 - 2 = ?$	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat?  $5 - ? = 3$	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before?  $? - 2 = 3$

	Total Unknown	Addend Unknown	Both Addends Unknown
<b>Put Together/Take Apart<sup>3</sup></b>	Three red apples and two green apples are on the table. How many apples are on the table?  $3 + 2 = ?$	Five apples are on the table. Three are red and the rest are green. How many apples are green?  $3 + ? = 5, 5 - 3 = ?$	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase?  $5 = 0 + 5, 5 = 5 + 0$ $5 = 1 + 4, 5 = 4 + 1$ $5 = 2 + 3, 5 = 3 + 2$



**Darker shading indicates the four Kindergarten problem subtypes. Grade 1 and 2 students work with all subtypes and variants. Unshaded (white) problems are the four difficult subtypes or variants that students should work with in Grade 1 but need not master until Grade 2.**

<sup>1</sup> Adapted from Box 2-4 of "Mathematics Learning in Early Childhood," National Research Council (2009, pp. 32, 33).

<sup>2</sup> These *take apart* situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children understand that the = sign does not always mean *makes* or *results in* but always does mean *is the same number as*.

<sup>3</sup> Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of this basic situation, especially for small numbers less than or equal to 10.

<sup>4</sup> For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operation (the version using more for the bigger unknown and using less for the smaller unknown). The other versions are more difficult.



Compose and decompose numbers 11–19 to gain foundations for place value (Standard K.NBT.1)

**Standard K.NBT.1** Compose and decompose numbers from 11–19 into ten ones and some further ones. Use objects or drawings and record each composition or decomposition by a drawing or equation. *For example,  $18 = 10 + 8$ .* Understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.

- Compose and decompose numbers from 11-19 into a group of ten ones and some more ones
- Use objects and drawings to represent numbers 11-19 as a group of ten ones and some more ones
- Connect physical representations (objects) to visual representations (drawings)
- Understand that the numbers 11-19 are made up of two digits
- Connect and use physical and visual representations to create equations to represent numbers 11-19 as ten plus a single-digit number equals a two-digit number ( $10 + 3 = 13$ )
- Move flexibly between recognizing and writing equations with the total on both sides of the equal sign

Teacher Note: In kindergarten, students compose and decompose numbers from 11–19 into ten ones and some further ones. They do not unitize a group of ten ones as a “ten.” In first grade, students extend this understanding to unitize a group of ten ones as a “ten.” They also understand two-digit numbers as having multiple “tens.”

- K.CC.1** Count to 100 by ones and by tens
- K.CC.3** Read and write numbers using base ten numerals from 0 to 20
- K.CC.4** Understand the relationship between numbers and quantities
- K.OA.3** Decompose numbers less than or equal to 10. Record each decomposition by a drawing or equation

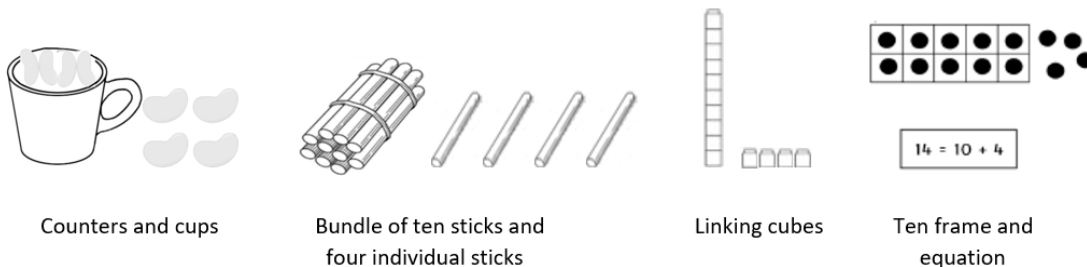
- 1.NBT.2** Understand that the two digits of a two-digit number represent amounts of tens and ones
- 1.NBT.3** Compare two two-digit numbers based on meanings of the tens and ones digits
- 2.NBT.1** Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones

Critical Background Knowledge

- Related Standards: Current Grade Level (see above)


ten, ones, digit(s), group, number, decompose, compose, equation, equal, plus, number names 1-19

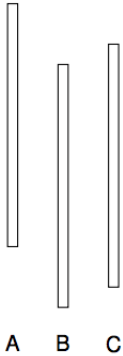

Groupable Base-ten Models

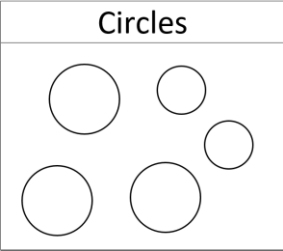
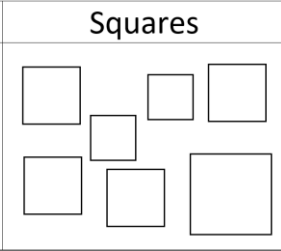
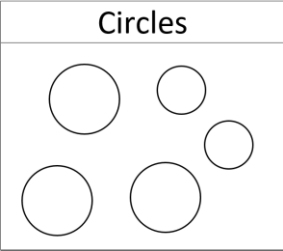
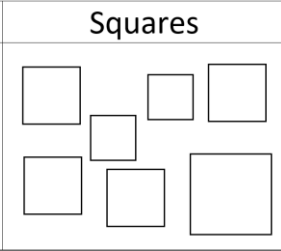
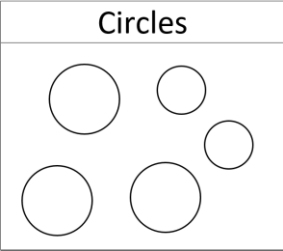
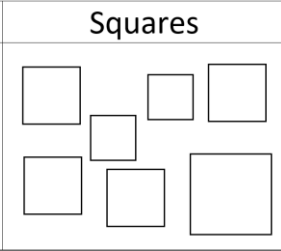


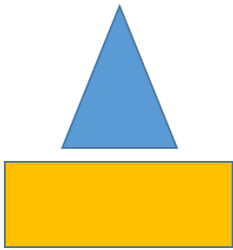
- Use a variety of groupable objects such as counters with cups, linking cubes, and bundles of sticks to represent a teen number
- Use ten frames to represent a teen number
- Use drawings to represent a teen number
- Write equations based on physical and visual representations
- Move from counting all to recognizing a group of ten ones and some more ones
- After much exposure to groupable base-ten models, use pregrouped base-ten models such as base-ten blocks to represent a number 11-19


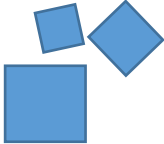
Images Sources: <http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/kindergarten.pdf> and p. 159


Describe and compare measurable attributes of objects (Standards K.MD.1–2)	
<b>Standard K.MD.1</b> Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>• Understand that objects are measured using different attributes (length, width, capacity and weight)</li> <li>• Understand that one object may have more or less of an attribute than another object (see Suggested Models below)</li> <li>• Describe several measurable attributes of a single object</li> <li>• Distinguish the difference between attributes and apply vocabulary appropriately (while a tower may be described as big or small, it may be more appropriate to describe the tower as tall or short)</li> </ul>	
Teacher Note: Students may informally work with area, volume, and capacity. Although these concepts are not explicitly introduced in kindergarten, students may begin to informally address these attributes. For example, students may identify the area of a paper to see if it could be used to draw a “big” or “small” picture. Students in kindergarten are not expected to use the formal terms of area, volume, and capacity.	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
<b>K.MD.2</b> Directly compare two objects with a measurable attribute in common <b>K.MD.3</b> Classify objects into given categories	<b>1.MD.1</b> Order three objects by length <b>1.MD.2</b> Express the length of an object as a whole number of units <b>2.MD.1</b> Measure the length of an object by selecting and using appropriate tools
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>• Students may have had informal experience labeling items as tall, short, big, small, heavy, etc.</li> </ul>	
Academic Vocabulary	
measure, attribute, size, big, small, length, long, short, height, tall, weight, heavy, light This list is non-exhaustive. Students should be exposed to other similar terms such as wide, thin, etc.	
Suggested Models	Suggested Strategies
 <p>A student may describe a bowling ball as “big and heavy,” and a feather as “light and long.”</p>	<ul style="list-style-type: none"> <li>• Give students an object and have them describe attributes of the object that can be measured</li> <li>• Use measurement vocabulary when talking about an object</li> <li>• Represent measurable attributes with drawings or manipulatives</li> <li>• Describe measurable attributes using gestures (hold arms out to describe an objects as big or long)</li> </ul>

Describe and compare measurable attributes of objects (Standards K.MD.1–2)	
<b>Standard K.MD.2</b> 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. <i>For example, directly compare the length of two pencils and describe one as shorter or longer.</i>	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>• Understand that two objects may have different amounts of the same attribute</li> <li>• Align endpoints of objects when comparing length or height</li> <li>• Consider conservation of length when comparing objects (For example, a length of string that is bent compared to a length of string that is straight, or a straw that is orientated vertically versus a pencil that is orientated horizontally)</li> <li>• Describe which object has more or less of an attribute (For example, the red pencil is longer than the blue pencil)</li> </ul>	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
<b>K.MD.1</b> Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.	<b>1.MD.1</b> Order three objects by length <b>1.MD.2</b> Express the length of an object as a whole number of units <b>2.MD.2</b> Measure the length of an object using different units, describe how the measurements relate to the size of the unit chosen <b>2.MD.4</b> Determine how much longer one objects is than another
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>• Related Standards: Current Grade Level (see above)</li> <li>• Students may have had informal experience comparing themselves to their peers and surroundings (For example, comparing their height, hair length, etc.)</li> </ul>	
Academic Vocabulary	
length, height, weight, size, compare, measure, attribute, taller, longer, shorter, heavier, lighter, bigger, smaller, more of, less of	
Suggested Models	Suggested Strategies
<p><b>Sticks whose endpoints are not aligned</b></p>  <p>A B C</p> <p>The larger bear is heavier than the smaller bear</p>  <p>When shown this figure and asked which is "the longest stick," students may point to A because it "sticks out the farthest." Similarly, they may recognize a 12-inch vertical line as "tall" and a 12-inch horizontal line as "long" but not recognize that the two are the same length.</p>	<ul style="list-style-type: none"> <li>• Manipulate objects to prove or disprove comparisons (see Suggested Models at the left)</li> <li>• Use language such as "it looks longer, but it isn't because the other object is bent," to discuss conservation of length</li> <li>• Use a third object to indirectly compare two objects (for example a tower of connecting cubes can be used to compare the height of a desk leg and the height of a window)</li> </ul>
Image Source: <a href="https://commoncoretools.files.wordpress.com/2012/07/ccss_progression_gm_k5_2012_07_21.pdf">https://commoncoretools.files.wordpress.com/2012/07/ccss_progression_gm_k5_2012_07_21.pdf</a>	

Classify objects and count the number of objects in each category (Standard K.MD.3).					
<b>Standard K.MD.3</b> Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. Limit the category counts to less than or equal to 10.					
Concepts and Skills to Master					
<ul style="list-style-type: none"> <li>• Identify similarities and differences between objects</li> <li>• Classify objects into given categories</li> <li>• Count the number of objects in each category (up to 10)</li> <li>• Sort categories by count (up to 10)</li> </ul>					
Related Standards: Current Grade Level	Related Standards: Future Grade Levels				
<p><b>K.MD.1-2</b> Describe and compare measurable attributes of objects</p> <p><b>K.CC.1, K.CC.4, K.CC.5</b> Count to tell the number of objects</p> <p><b>K.CC.6</b> Use matching or counting strategies to identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group</p> <p><b>K.CC.7</b> Compare two numbers between 1 and 10 using “greater than,” “less than,” or “equal to”</p>	<p><b>1.MD.4</b> Organize, represent, and interpret data with up to three categories</p> <p><b>2.MD.10</b> Draw a picture graph and a bar graph with single-unit scale to represent a data set with up to four categories</p>				
Critical Background Knowledge					
<ul style="list-style-type: none"> <li>• Related Standards: Current Grade Level (see above)</li> <li>• Students may have prior knowledge with informally classifying and sorting objects.</li> </ul>					
Academic Vocabulary					
classify, sort, groups, categories, count					
Suggested Models	Suggested Strategies				
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Circles</th> <th style="text-align: center;">Squares</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </tbody> </table> <p>“There are 5 circles and 7 squares. There are more squares than circles.”</p>	Circles	Squares			<ul style="list-style-type: none"> <li>• Sort collections of objects in a variety of ways (shape, size, color, etc.)</li> <li>• Use buttons, manipulatives, shapes, cereal, etc. to sort</li> <li>• Sort objects into categories of choice and describe how collections have been sorted</li> <li>• Count objects in each collection</li> </ul>
Circles	Squares				
					

Identify and describe shapes, including squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres (Standards K.G.1–3).	
<b>Standard K.G.1</b> 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.	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>• Locate and identify shapes in the environment (notice tiles on the floor are squares or the clock is a circle) moving from informal language (ball, box, can, etc.) to formal vocabulary (sphere, cube, cylinder, etc.)</li> <li>• Use positional words to indicate relative position of objects; such as above, below, beside, in front of, behind, next to, etc.</li> </ul> <p>Teacher note: Students develop geometric concepts and spatial reasoning from experience with two perspectives on space: the shapes of objects and the relative positions of objects. Students refine their informal language by learning mathematical concepts and vocabulary to increasingly describe their physical world from geometric perspectives including shape, orientation, and spatial relations.</p>	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
<p><b>K.G.2</b> Correctly name shapes regardless of orientation and size</p> <p><b>K.G.3</b> Identify shapes as 2-D (flat) or 3-D (solid)</p> <p><b>K.G.4</b> Analyze and compare 2-D and 3-D shapes using informal language</p> <p><b>K.G.5</b> Model shapes by building and drawing</p> <p><b>K.G.6</b> Compose simple shapes to form larger shapes</p>	<p><b>1.G.1</b> Distinguish between defining attributes. Build and draw shapes that possess defining attributes</p> <p><b>1.G.2</b> Compose shapes built from more than one shape</p> <p><b>2.G.1</b> Recognize and draw shapes having specified attributes</p>
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>• Recognize and informally name two- and three-dimensional shapes (tiles, bricks, clocks, balls, boxes, cans, hats, etc.)</li> </ul>	
Academic Vocabulary	
square, circle, triangle, rectangle, hexagon, cube, cone, cylinder, sphere, above, on top, below, under, beside, in front of, behind, between, next to	
Suggested Models	Suggested Strategies
 <p>Ask students to describe what they notice. Students may say, “The triangle is above the rectangle. The rectangle is below the triangle.”</p>	<ul style="list-style-type: none"> <li>• Describe the location of shapes in pictures</li> <li>• Using both two-dimensional and three-dimensional shapes, find the object in the environment and describe the relative positions compared to other objects</li> <li>• Use manipulatives to model and investigate position words</li> <li>• Identify 2-dimensional and 3-dimensional shapes in the classroom and environment</li> </ul>

Identify and describe shapes, including squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres (Standards K.G.1–3).	
<b>Standard K.G.2</b> Correctly name shapes regardless of their orientations or overall sizes.	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>• Understand orientation does not change the name of the shape</li> <li>• Understand size of shape does not change the name of the shape</li> <li>• Reorient shapes to show that translating, rotating, or reflecting the shape does not change the shape (students are not expected to use formal vocabulary for these transformations)</li> </ul> <p>Teacher Note: In learning about shapes, it is important to vary the examples in many ways so that students do not learn limited concepts that they must later unlearn. Common misconceptions will occur when shapes are rotated or reflected. Students may struggle to identify triangles without a side positioned horizontally on the bottom. Squares rotated with a vertex on top are still squares. The measures of angles and side lengths are preserved and therefore the shape is still a square. “Diamond” is not a mathematical term, and therefore should not be used to describe shapes.</p>	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
<p><b>K.G.1</b> Describe objects in the environment using names of shapes and positional words</p> <p><b>K.G.3</b> Identify shapes as 2-D (flat) or 3-D (solid)</p> <p><b>K.G.4</b> Analyze and compare 2-D and 3-D shapes using informal language</p> <p><b>K.G.5</b> Model shapes by building and drawing</p> <p><b>K.G.6</b> Compose simple shapes to form larger shapes</p>	<p><b>1.G.1</b> Distinguish between defining attributes. Build and draw shapes that possess defining attributes</p> <p><b>1.G.2</b> Compose shapes built from more than one shape</p> <p><b>2.G.1</b> Recognize and draw shapes having specified attributes</p>
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>• Recognize and informally name two and three-dimensional shapes (tiles, bricks, clocks, balls, boxes, cans, hats, etc.)</li> </ul>	
Academic Vocabulary	
<p>square, circle, triangle, rectangle, hexagon, cube, cone, cylinder, sphere, shape, size, large, small, medium</p> <p>Students may, but are not expected to use words such as reflect, flip, rotate, turn, slide, move up, move down, etc.</p>	
Suggested Models	Suggested Strategies
 <p>Triangles in various orientations and sizes</p>  <p>Squares in various orientations and sizes</p>	<ul style="list-style-type: none"> <li>• Use geoboards to make shapes in differing sizes and/or orientations</li> <li>• Use a long string, pipe cleaners, toothpicks, clay, linking cubes, etc. to create shapes of differing sizes (stretch string into circles, squares, rectangles, triangles, etc.)</li> <li>• Use a pattern block shape to describe a similar larger shape in the room, have a partner guess the item</li> <li>• Sort shapes of various sizes and orientations into categories based on the name of the shapes</li> <li>• Show a shape and have students draw another example of the shape</li> </ul>

Identify and describe shapes, including squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres (Standards K.G.1–3).	
<b>Standard K.G.3</b> Identify shapes as two-dimensional ("flat") or three-dimensional ("solid").	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>• Distinguish between flat and solid shapes (flat shapes are drawn, solid shapes can be held)</li> <li>• Use appropriate vocabulary to name shapes and identify them as two-dimensional or three-dimensional shapes</li> </ul> <p>Teacher Note: When identifying an object as a shape, use two-dimensional vocabulary when referring to two-dimensional shapes and use three-dimensional vocabulary when referring to three-dimensional shapes (a ball is a sphere, not a circle). While pattern blocks are three-dimensional shapes, in kindergarten it is appropriate to refer to the base of the pattern block as the name of the two-dimensional shape.</p>	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
<p><b>K.G.1</b> Describe objects in the environment using names of shapes and positional words</p> <p><b>K.G.2</b> Correctly name shapes regardless of orientation and size</p> <p><b>K.G.4</b> Analyze and compare 2-D and 3-D shapes using informal language</p> <p><b>K.G.5</b> Model shapes by building and drawing</p> <p><b>K.G.6</b> Compose simple shapes to form larger shapes</p>	<p><b>1.G.1</b> Distinguish between defining attributes. Build and draw shapes that possess defining attributes</p> <p><b>1.G.2</b> Compose two- and three-dimensional shapes built from more than one shape</p> <p><b>2.G.1</b> Recognize and draw shapes having specified attributes</p>
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>• Recognize and informally name shapes as flat or solid (a baseball is a ball and something that can be held in a hand)</li> </ul>	
Academic Vocabulary	
square, circle, triangle, rectangle, hexagon, cube, cone, cylinder, sphere, flat, solid, two-dimensional, three-dimensional	
Suggested Models	Suggested Strategies
 <p>Name the shapes and tell if they are flat or solid</p>	<ul style="list-style-type: none"> <li>• Choose a shape from a collection, identify it as flat or solid</li> <li>• Go on a shape walk to find two- and three- dimensional shapes</li> <li>• Use magnetic shapes to construct two- and three-dimensional shapes</li> <li>• Trace the face of a three-dimensional object (such as a pattern block) to identify the two-dimensional shape</li> </ul>



Analyze, compare, create, and compose shapes (Standards K.G.4–6).

**Standard K.G.4** Analyze, compare, and sort two- and three-dimensional shapes and objects, in different sizes and orientations, using informal language to describe their similarities, differences, and other attributes (*for example, color, size, shape, number of sides*).

Concepts and Skills to Master

- Understand that shapes must be closed; circles are round; squares, triangles, rectangles, and hexagons are composed of straight sides
- Analyze two- and three-dimensional shapes noticing the similarities and differences
- Analyze/describe shapes by recognizing the size and color of shapes
- Compare two-dimensional shapes with two-dimensional shapes, compare three-dimensional shapes with three-dimensional shapes, and compare two-dimensional shapes with three-dimensional shapes
- Sort shapes based on number of dimensions (two-dimensional, three-dimensional), number of sides (three sides, four sides, etc.), size (small, large, etc.), shape (circles, spheres, squares, rectangles, etc.), color (green, blue, etc.) (The teacher should not convey the misconception that size and color are defining attributes of shape; for example, not all triangles should be green and not all squares should be orange. Students will distinguish between defining and non-defining attributes in first grade.)
- Identify individual faces of three-dimensional solids as two-dimensional geometric shapes (for example, a cylinder has two faces that are circles)

Teacher Note: “The emphasis at (this) level . . . is on shapes that students can observe, feel, build take apart, or work with in some manner. The general goal is to explore how shapes are alike and different and to use these ideas to create classes of shapes (both physically and mentally). Some of these classes of shapes have names-- rectangles, triangles, prisms, cylinders, and so on.” (Van de Walle, J. A, Karp, K., & Bay-Williams, J. M. (2013). *Elementary and middle school mathematics: teaching developmentally*. 8th ed. / Boston: Pearson. pp. 403)

Related Standards: Current Grade Level

- K.G.1** Describe objects in the environment using names of shapes and positional words
- K.G.2** Correctly name shapes regardless of orientation and size
- K.G.3** Identify shapes as 2-D (flat) or 3-D (solid)
- K.G.5** Model shapes by building and drawing
- K.G.6** Compose simple shapes to form larger shapes

Related Standards: Future Grade Levels

- 1.G.1** Distinguish between defining attributes. Build and draw shapes that possess defining attributes
- 2.G.1** Recognize and draw shapes having specified attributes

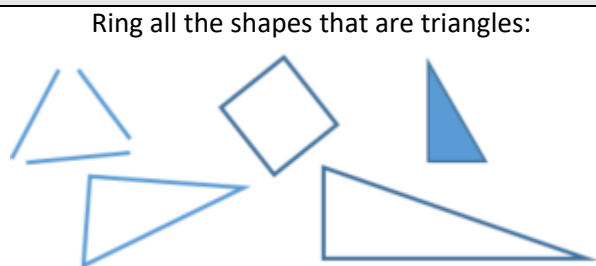
Critical Background Knowledge

- Related Standards: Current Grade Level (see above)

Academic Vocabulary

shape, square, circle, triangle, rectangle, hexagon, cube, cone, cylinder, sphere, flat, solid, two-dimensional, three-dimensional, describe, compare, sort, same, alike, different, size, attributes, sides, straight, round


Suggested Models

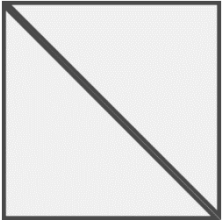



Suggested Strategies

- Given a collection of two- and/or three-dimensional shapes, sort them and explain why
- Trace a single face of a three-dimensional figure to identify the two-dimensional shape of that face
- Identify the similarities and differences of two given shapes
- Given a piece of paper with different shapes drawn on it, circle or color all of the same shape regardless of size or orientation
- Given a list of attributes describing a shape, point to the correct shape

Image source: <http://www.ncpublicschools.org/docs/curriculum/mathematics/scos/kindergarten.pdf>

Analyze, compare, create, and compose shapes (Standards K.G.4–6).	
<b>Standard K.G.5</b> Model and create shapes from components such as sticks and clay balls.	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>Model shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres) given a name or attributes (such as number of sides or corners) by drawing and creating shapes with clay, sticks, and other materials (accuracy of drawings may be limited by a student’s fine motor skills; students are not expected to draw three-dimensional shapes)</li> </ul> <p>Teacher Note: Students learn to represent shapes informally with drawings and by building them from components. With repeated experiences such as these, students become more precise. They begin to attend to attributes, such as being a triangle, square, or rectangle, and being closed figures with straight sides. (<a href="http://commoncoretools.me/wp-content/uploads/2014/12/ccss_progression_gk6_2014_12_27.pdf">http://commoncoretools.me/wp-content/uploads/2014/12/ccss_progression_gk6_2014_12_27.pdf</a>)</p>	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
<p><b>K.G.1</b> Describe objects in the environment using names of shapes and positional words</p> <p><b>K.G.2</b> Correctly name shapes regardless of orientation and size</p> <p><b>K.G.3</b> Identify shapes as 2-D (flat) or 3-D (solid)</p> <p><b>K.G.4</b> Analyze and compare 2-D and 3-D shapes using informal language</p> <p><b>K.G.6</b> Compose simple shapes to form larger shapes</p>	<p><b>1.G.1</b> Distinguish between defining attributes. Build and draw shapes that possess defining attributes</p> <p><b>1.G.2</b> Compose 2-D and 3-D shapes to create composite shapes</p> <p><b>2.G.1</b> Recognize and draw shapes having specified attributes</p>
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>Related Standards: Current Grade Level (see above)</li> <li>Recognize and informally name two- and three-dimensional shapes (tiles, bricks, clocks, balls, boxes, cans, hats, etc.)</li> </ul>	
Academic Vocabulary	
shape, square, circle, triangle, rectangle, hexagon, cube, cone, cylinder, sphere, flat, solid, two-dimensional, three-dimensional, build, create, draw, attribute, sides, corners/vertices, straight, round	
Suggested Models	Suggested Strategies
	<ul style="list-style-type: none"> <li>Draw/reproduce shapes in the air, in sand, in clay, etc.</li> <li>Practice modeling/drawing shapes after teacher modeling</li> <li>Move flexibly between shape names, pictured shapes, and physical shape models</li> <li>Identify a shape in a picture, then reproduce that shape</li> <li>Lead the class to count the number of sides in a shape, then instruct the students to draw the shape</li> <li>Create two-dimensional and three-dimensional shapes using components such as sticks, marshmallows, pipe cleaners, etc.</li> </ul>

Analyze, compare, create, and compose shapes (Standards K.G.4–6).	
<b>Standard K.G.6</b> Compose simple shapes to form larger shapes. <i>For example, “Can you join these two triangles with full sides touching to make a rectangle?”</i>	
Concepts and Skills to Master	
<ul style="list-style-type: none"> <li>Manipulate two or more shapes to create a different shape (two triangles make a square) or larger shape (four triangles make a larger triangle)</li> <li>Understand that larger shapes can be composed of smaller shapes</li> <li>Describe the larger shape made from smaller shapes</li> </ul> <p>Teacher Note: This is a concrete standard. Students should informally explore combining physical objects through trial and error. Composing shapes supports measurement concepts and provides students with opportunities to informally examine attributes such as equal side lengths or angle sizes. Composing shapes supports composing and decomposing numbers and also supports partitioning shapes for development of fraction understanding.</p>	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
<p><b>K.G.1</b> Describe objects in the environment using names of shapes and positional words</p> <p><b>K.G.2</b> Correctly name shapes regardless of orientation and size</p> <p><b>K.G.3</b> Identify shapes as 2-D (flat) or 3-D (solid)</p> <p><b>K.G.4</b> Analyze and compare 2-D and 3-D shapes using informal language</p> <p><b>K.G.5</b> Model shapes by building and drawing</p>	<p><b>1.G.2</b> Compose 2-D and 3-D shapes to create composite shapes and compose new shapes from the composite shapes (trapezoids, half and quarter circles)</p> <p><b>1.G.3</b> Partition circles and rectangles into two and four equal shares; describe the shares as halves, fourths, and quarters</p> <p><b>1.MD.2</b> Measure length by laying multiple copies of an object (align edges of shapes or objects)</p> <p><b>2.G.3</b> Partition circles and rectangles into two, three, and four equal shares; describe the shares as halves, thirds, half of, etc.</p>
Critical Background Knowledge	
<ul style="list-style-type: none"> <li>Students may have experience informally manipulating shapes</li> </ul>	
Academic Vocabulary	
create, compose, combine, build, add to, different, larger, simple shape, square, triangle, rectangle, hexagon	
Suggested Models	Suggested Strategies
 	<ul style="list-style-type: none"> <li>Use media such as clay, string, pipe cleaners, etc. to create, build, and add to shapes</li> <li>Use manipulatives such as pattern blocks, tangrams, paper shapes, etc. to create, build, and add to shapes</li> <li>Solve puzzles or create pictures from various shapes</li> <li>Describe new shapes comprised of smaller shapes</li> </ul>