Revised 10/20/2016

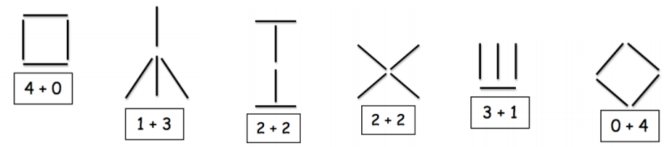
Kindergarten

GUSD Kindergarten Grade Math

- **CC Counting and Cardinality**
- **O.A.- Operations and Algebraic Thinking**
- **N.B.T.- Numbers and Operations in Base Ten**
- **M.D.- Measurement and Data**
- **G.-Geometry**

Math Sequence	Standards (Priority)	I can statements…	Examples
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)	I can write the numbers from 0 to 20. I can write the numeral for the number of objects I counted.	Students write the numerals 0-20 and use the written numerals 0-20 to represent the amount within a set. For example, if the student has counted 9 objects, then the written numeral "9" is recorded. 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. For example, if a student picks up the number card "13", the student then creates a pile of 13 counters. While children may experiment with writing numbers beyond 20, this standard places emphasis on numbers 0-20. Due to varied development of fine motor and visual development, reversal of numeral is anticipated. While reversals should be pointed out to students and correct formation modeled in instruction, the emphasis of this standard is on the use of numerals to represent quantities rather than the correct handwriting formation of the actual numeral itself.
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.	I can answer 'how many' questions about up to 20 items that are arranged in a line, array, or circle. I can answer 'how many' questions about up to 10 items that are in a scattered configuration. I can count to show a given number up to 20 by counting out objects.	In order to answer "how many?" students need to keep track of objects when counting. Keeping track is a method of counting that is used to count each item once and only once when determining how many. After numerous experiences with counting objects, along with the developmental understanding that a group of objects counted multiple times will remain the same amount, students recognize the need for keeping track in order to accurately determine "how many". Depending on the amount of objects to be counted, and the students' confidence with counting a set of objects, students may move the objects as they count each, point to each object as counted, look without touching when counting, or use a combination of these strategies. It is important that children develop a strategy that makes sense to them based on the realization that keeping track is important in order to get an accurate count, as opposed to following a rule, such as "Line them all up before you count", in order to get the right answer. As children learn to count accurately, they may count a set correctly one time, but not another. Other times they may be able to keep track up to a certain amount, but then lose track from then on. Some arrangements, such as a line or rectangular array, are easier for them to get the correct answer but may limit their flexibility with developing meaningful tracking strategies, so providing multiple arrangements help children learn how to keep track. Since scattered arrangements are the most challenging for students, this standard specifies that students only

			count up to 10 objects in a scattered arrangement and count up to 20 objects in a line, rectangular array, or circle.
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.)	I can model addition with objects, fingers, drawings, etc. I can model subtraction with objects, fingers, drawings, etc.	Students 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 focused on understanding the concept of addition and subtraction, rather than reading and solving addition and subtraction number sentences (equations). Common Core State Standards for Mathematics states, “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). Therefore, before introducing symbols (+, -, =) and equations, kindergarteners require numerous experiences using joining (addition) and separating (subtraction) vocabulary in order to attach meaning to the various symbols. For example, when explaining a solution, kindergartens may state, “Three and two is the same amount as 5.” While the meaning of the equal sign is not introduced as a standard until First Grade, if equations are going to be modeled and used in Kindergarten, students must connect the symbol (=) with its meaning (is the same amount/quantity as).
K. OA.5	Fluently add and subtract within 5.	I can fluently add within 5. I can fluently subtract within 5.	Students are fluent when they display accuracy (correct answer), efficiency (a reasonable amount of steps in about 3-5 seconds* without resorting to counting), and flexibility (using strategies such as the distributive property). Students develop fluency by understanding and internalizing the relationships that exist between and among numbers. 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). Once they have reached this milestone, children need repeated experiences with many different types of concrete materials (such as cubes, chips, and buttons) over an extended amount of time in order to recognize that there are only particular sub-parts for each number. Therefore, children will realize that if 3 and 2 is a combination of 5, then 3 and 2 cannot be a combination of 6. For example, after making various arrangements with toothpicks, students learn that only a certain number of sub-parts exist within the number 4:

			 Then, after numerous opportunities to explore, represent and discuss “4”, a student becomes able to fluently answer problems such as, “One bird was on the tree. Three more birds came. How many are on the tree now?”; and “There was one bird on the tree. Some more came. There are now 4 birds on the tree. How many birds came?”. 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 and developing relationships between numbers help children internalize parts of number and develop efficient strategies for fact retrieval.
K.G.2	Correctly name shapes regardless of their orientations or overall size.	I can name shapes regardless of their orientation or size	Through numerous experiences exploring and discussing shapes, students begin to understand that certain attributes define what a shape is called (number of sides, number of angles, etc.) and that other attributes do not (color, size, orientation). As the teacher facilitates discussions about shapes (“Is it still a triangle if I turn it like this?”), children question what they “see” and begin to focus on the geometric attributes. Kindergarten students typically do not yet recognize triangles that are turned upside down as triangles, since they don’t “look like” triangles. Students need ample experiences manipulating shapes and looking at 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.

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Math Sequence	Standards (Supporting)	I can statements…	Examples
K.CC.1	I count to 100 by ones and tens.	I can count to 100 by ones. I can count to 100 by tens.	Students rote count by starting at one and counting to 100. When counting by ones, students need to understand that the next number in the sequence is one more. When students count by tens they are only expected to master counting on the decade (0, 10, 20, 30, 40 …). When counting by tens, students need to understand that the next number in the sequence is "ten more" (or one more group of ten). 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).	I can count to 100 starting at any number.	Students begin a rote forward counting sequence from a number other than 1. Thus, given the number 4, the student would count, "4, 5, 6, 7 …" This objective does not require recognition of numerals. It is focused on the rote number sequence 0-100.
K.CC.4	Understand the relationship between numbers and quantities; connect counting to cardinality.		Students count a set of objects and see sets and numerals in relationship to one another. These connections are higher-level skills that require students to analyze, reason about, and explain relationships between numbers and sets of objects. The expectation is that students are comfortable with these skills with the numbers 1-20 by the end of Kindergarten.

K.CC.4.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	I can count objects by saying the number names in standard order, pairing each object with one and only one number name and each number name with only one object.	Students implement correct counting procedures by pointing to one object at a time (one-to-one correspondence), using one counting word for every object (synchrony/ one-to-one tagging), while keeping track of objects that have and have not been counted. This is the foundation of counting.
K.CC.4.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.	I can understand that the last number name I said tells the number of objects counted.	Students 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). Since an important goal for children is to count with meaning, it is important to have children answer the question, “How many do you have?” after they count. Often times, children who have not developed cardinality will count the amount again, not realizing that the 10 they stated means 10 objects in all. Young children believe what they see. Therefore, they may believe that a pile of cubes that they counted may be more if spread apart in a line. As children move towards the developmental milestone of conservation of number, they develop the understanding that the number of objects does not change when the objects are moved, rearranged, or hidden. Children need many different experiences with counting objects, as well as maturation, before they can reach this developmental milestone.
K.CC.4.c	Understand that each successive number name refers to a quantity that is one larger.	I can understand that each successive number name is one more than the previous number.	Another important milestone in counting is inclusion (aka hierarchal inclusion). Inclusion is based on the understanding that numbers build by exactly one each time and that they nest within each other by this amount. For example, a set of three objects is nested within a set of 4 objects; within this same set of 4 objects is also a set of two objects and a set of one. Using this understanding, if a student has four objects and wants to have 5 objects, the student is able to add one more- knowing that four is within, or a sub-part of, 5 (rather than removing all 4 objects and starting over to make a new set of 5). This concept is critical for the later development of part/whole relationships. Students are asked to understand this concept with and without (0-20) objects. For example, after counting a set of 8 objects, students 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?”

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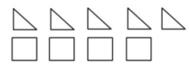
<td>K.CC.6</td>
<td>Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.[1]

[1]Include groups with up to ten objects.</td>
<td>I can compare two groups of objects and decide which group is greater than, less than, or equal to.</td>
<td>Students use their counting ability to compare sets of objects (0-10). They may use matching strategies (Student 1), counting strategies (Student 2) 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.
<table>
<tr>
<td>Student 1
I lined up one square and one triangle. Since there is one extra triangle, there are more triangles than squares.
</td>
<td>Student 2
I counted the squares and I got 4. Then I counted the triangles and got 5. Since 5 is bigger than 4, there are more triangles than squares.</td>
<td>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.</td>
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<td>K.CC.7</td>
<td>Compare two numbers between 1 and 10 presented as written numerals.</td>
<td>I can compare two written numerals and decide which is greater than, less than, or equal to.</td>
<td>Students apply their understanding of numerals 1-10 to compare one numeral from another. Thus, looking at the numerals 8 and 10, a student is able to recognize that the numeral 10 represents a larger amount than the numeral 8. Students need ample experiences with actual sets of objects (K.CC.3 and K.CC.6) before completing this standard with only numerals.</td>
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<tr>
<td>K.OA.2</td>
<td>Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.</td>
<td>I can add within 10 to solve word problems by using objects or drawings.

I can subtract within 10 to solve word problems by using objects or drawings.</td>
<td>Kindergarten students solve four types of problems within 10: Result Unknown/Add To; Result Unknown/Take From; Total Unknown/Put Together-Take Apart; and Both Addends Unknown/Put Together-Take Apart. Kindergarteners use counting to solve the four problem types by acting out the situation and/or with objects, fingers, and drawings.
<table>
<tr>
<th>Add To
Result Unknown</th>
<th>Take From
Result Unknown</th>
<th>Put Together/Take Apart Total Unknown</th>
<th>Put Together/Take Apart Both Addends Unknown</th>
</tr>
<tr>
<td>Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now?

2 + 3 = ?</td>
<td>Five apples were on the table. I ate two apples. How many apples are on the table now?

5 – 2 = ?</td>
<td>Three red apples and two green apples are on the table. How many apples are on the table?

3 + 2 = ?</td>
<td>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</td>
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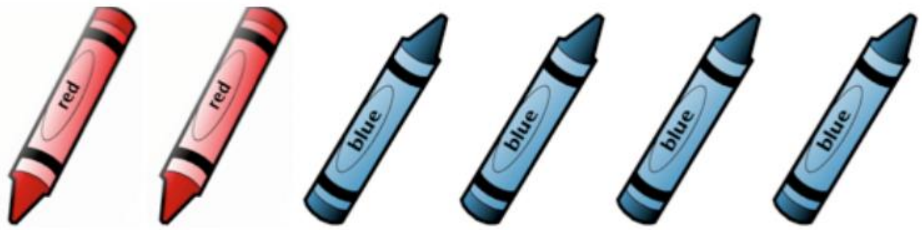
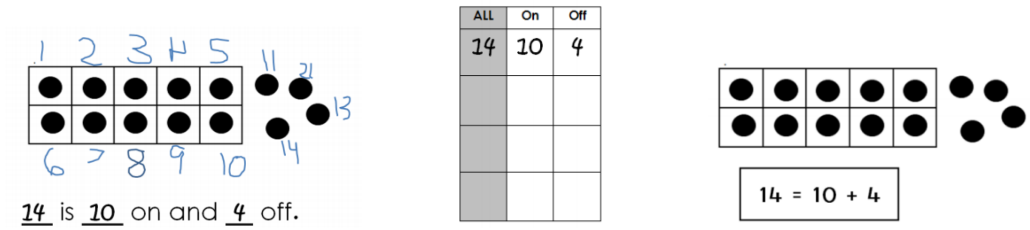
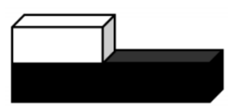
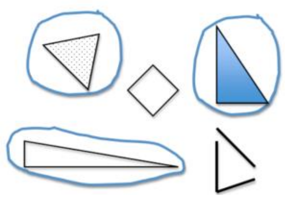
			Example: **Nine grapes were in the bowl. I ate 3 grapes. How many grapes are in the bowl now?** Student: I got 9 "grapes" and put them in my bowl. Then, I took 3 grapes out of the bowl. I counted the grapes still left in the bowl… 1, 2, 3, 4, 4, 5, 6. Six. There are 6 grapes in the bowl. Example: **Six crayons are in the box. Some are red and some are blue. How many crayons can be red, and how many crayons can be blue?** **(Possible solution) Student:** I have 6 crayons. I moved these two over and pretended they were red. Then, I counted the "blue" ones... 1, 2, 3, 4. Four. There are 4 blue crayons. 
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).	I can decompose numbers less than or equal to 10 by using objects or drawings. (3 + 2 = 5)	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 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 (decompose), students use the understanding that a smaller set of objects exists within that larger set (inclusion). 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 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.

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.	I can find the number that makes 10 when added to a given number that is less than 10.	Students build upon the understanding that a number (less than or equal to 10) 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. Example: When working with 2-color beans, a student determines that 4 more beans are needed to make a total of 10.  "I have 6 beans. I need 4 more beans to have 10 in all." In addition, kindergarteners use various materials to solve tasks that involve decomposing and composing 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?** **Student A:** *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's no juice in these 4 spaces. So, 4 are missing." **Student B:** *Think Addition* "I counted out 10 counters because I knew there needed to be ten. I pushed these 6 over here because they were in the container. These are left over. So there's 4 missing." **Student C:** *Fluently add/subtract* "I know that it's 4 because 6 and 4 is the same amount as 10."
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.	I can compose and decompose numbers from 11 to 19 into ten ones and some further ones. I can show each composition or decomposition by a drawing or equation.	Students explore numbers 11-19 using representations, such as manipulatives or drawings. Keeping each count as a single unit, kindergarteners use 10 objects to represent "10" rather than creating a unit called a ten (unitizing) as indicated in the First Grade CCSS standard 1.NBT.1a: 10 can be thought of as a bundle of ten ones — called a "ten." Example: **Teacher**: "I have some chips here. Do you think they will fit on our ten frame? Why? Why Not?" **Students**: Share thoughts with one another. Teacher: "Use your ten frame to investigate." **Students**: "Look. There's too many to fit on the ten frame. Only ten chips will fit on it." **Teacher**: "So you have some leftovers?" Students: "Yes. I'll put them over here next to the ten frame." Teacher: "So, how many do you have in all?" **Student A**: "One, two, three, four, five… ten, eleven, twelve, thirteen, fourteen. I have fourteen. Ten fit on and four didn't." **Student B**: Pointing to the ten frame, "See them- that's 10… 11, 12, 13, 14. There's fourteen." Teacher: Use your recording sheet (or number sentence cards) to show what you found out.

			<u>Student Recording Sheets Example:</u> 
K.MD.1	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.	I can describe an object using one of its measurable attributes such as length or weight. I can describe one object using several measurable attributes.	Students describe measurable attributes of objects, such as length, weight, and size. For example, a student may describe a shoe with one attribute, “My shoe is heavy!”, or more than one attribute, “This shoe is heavy! It’s also really long.” Students often initially hold undifferentiated views of measurable attributes, saying that one object is “bigger” than another whether it is longer, or greater in area, or greater in volume, and so forth. For example, two students might both claim their block building is “the biggest.” Conversations about how they are comparing- one building may be taller (greater in length) and another may have a larger base (greater in area) help students learn to discriminate and name these measurable attributes. As they discuss these situations and compare objects using different attributes, they learn to distinguish, label, and describe several measurable attributes of a single object. Thus, teachers listen for and extend conversations about things that are “big”, or “small,” as well as “long,” “tall,” or “high,” and name, discuss, and demonstrate with gestures the attribute being discussed.
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.	I can compare two objects with a measurable attribute in common and describe the difference. For example, I can directly compare the sizes of two geometric shapes and describe one of the two shapes as larger/smaller.	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, “The blue block is a lot longer than the white one.” Students are not comparing objects that cannot be moved and lined up next to each other.  Similar to the development of the understanding that keeping track is important to obtain an accurate count, kindergarten students need ample experiences with comparing objects in order to discover the importance of lining up the ends of objects in order to have an accurate measurement.

			As this concept develops, children move from 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.” to the understanding that “This block is always longer than this block (with each end lined up appropriately).” Since this understanding requires conservation of length, a developmental milestone for young children, kindergarteners need multiple experiences measuring a variety of items and discussing findings with one another.  “Sometimes this block is longer and sometimes it’s shorter”  “The Dark block is always longer than this block” As students develop conservation of length, learning and using language such as “It looks longer, but it really isn’t longer” is helpful.
K.MD.3	Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.	I can classify objects into given categories. I can count the numbers of objects in each category. I can sort the categories by count. (Less than or equal to 10).	Students 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. Thus, like amounts are grouped together, but not necessarily ordered. <u>For example</u>**, when exploring a collection of buttons:** First, 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. “I put the purple buttons next to the green buttons because purple also had (4). Blue has 5 and orange has 3. There aren’t any other colors that have 5 or 3. So they are sitting by themselves.” This objective helps to build a foundation for data collection in future grades as they create and analyze various graphical representations.

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.	I can describe objects around me using names of shapes. I can describe their relative positions using terms like above, below, beside, in front of, etc.	Students locate and identify shapes in their environment. For example, a student may look at the tile pattern arrangement on the hall floor and say, "Look! I see squares! They are next to the triangle." At first students may use informal names e.g., "balls," "boxes," "cans". Eventually students refine their informal language by learning mathematical concepts and vocabulary and identify, compare, and sort shapes based on geometric attributes.* Students also use positional words (such as those italicized in the standard) to describe objects in the environment, developing their spatial reasoning competencies. Kindergarten students need numerous experiences identifying the location and position of actual two-and-three-dimensional objects in their classroom/school prior to describing location and position of two-and-three-dimension representations on paper.
K.G.3	Identify shapes as two-dimensional (lying in a plane, "flat") or three dimensional ("solid").	I can identify two-dimensional shapes. I can identify three-dimensional shapes.	Students identify objects as flat (2 dimensional) or solid (3 dimensional). As the teacher embeds the vocabulary into students' exploration of various shapes, students use the terms two-dimensional and three-dimensional as they discuss the properties of various shapes.
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).	I can describe how two-dimensional shapes are alike and different. I can describe how three-dimensional shapes are alike and different.	Students relate one shape to another as they note similarities and differences between and among 2-D and 3-D shapes using informal language. For example, when comparing a triangle and a square, they note that they both are closed figures, have straight sides, but the triangle has 3 sides while the square has 4. Or, when building in the Block Center, they notice that the faces on the cube are all square shapes. Kindergarteners also distinguish between the most typical examples of a shape from obvious non-examples. For example: When identifying the triangles from a collection of shapes, a student circles all of the triangle examples from the non-examples. 

K.G.5	Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.	I can build and draw shapes from the world around me.	Students apply their understanding of geometric attributes of shapes in order to create given shapes. For example, students 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. Because two-dimensional shapes are flat and three-dimensional shapes are solid, students may draw or build two-dimensional shapes and only build three-dimensional shapes. Shapes could be built using materials such as clay, toothpicks, marshmallows, gumdrops, straws, pipe cleaners, etc. Students should understand and identify two-dimensional shapes used to construct three-dimensional shapes.
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?"	I can make and/or draw simple shapes. I can use these simple shapes to make a larger shape. (For example, two triangles can from a rectangle).	This standard 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 move, rotate, flip, and arrange puzzle pieces to complete a puzzle. Kindergarteners use their experiences with puzzles to use simple shapes to create different shapes. For example, when using basic shapes to create a picture, a student flips and turns triangles to make a rectangular house. Students also combine shapes to build pictures. They first use trial and error (part a) and gradually consider components (part b).