## Kindergarten Common Core State Standards

This document is intended to show the connections to the Standards of Mathematical Practices for the content standards and to get detailed information at each level. Resources used: CCSS, Arizona

to help teachers understand what each standard means in terms of what students must know and be able to do. It provides only a t@aicher should be to guide students in understanding &making sense

of the mathematics they are presented.

## Mathematical Practice Standards (MP) summary of each standard

- 1. Make sense of problems and persevere in solving them.
  - Mathematically proficient students interpret and make meaning of the problem looking for starting points. In Kindergarten, students begin to build the understanding that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, Does this make sense? or they may try another strategy.
- 2. Reason abstractly and quantitatively.
  - Mathematically proficient students make sense of quantities and their relationships. Younger students begin to recognize that a number represents a specific quantity. Then, they connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.
- 3. Construct viable arguments and critique the reasoning of others.

  Mathematically proficient students analyze problems and use stated mathematical assumptions, definitions, and established results in constructing arguments. They justify conclusions with mathematical ideas. They listen to the arguments of others and ask useful questions to determine if an argument makes sense or suggest ideas to improve/revise the argument. Younger students construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also begin to develop their mathematical communication skills as they participate in mathematical discussions involving questions like. How did you get that? and Why is that true? They explain their thinking to others and respond to others' thinking.
- 4. Model with mathematics.
  - Mathematically proficient students understand that models are a way to reason quantitatively and abstractly (able to decontextualize and contextualize). In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
- 5. Use appropriate tools strategically.
  - Mathematically proficient students use available tools recognizing the strengths and limitations of each. Younger students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, kindergarteners may decide that it might be advantageous to use linking cubes to represent two quantities and then compare the two representations side-by-side. They use technological tools to deepen their understanding of mathematics.
- 6. Attend to precision. As K-1 students begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning.
- 7. Look for and make use of structure. (Deductive Reasoning) Mathematically proficient students apply general mathematical rules to specific situations. They look for the overall structure and patterns in mathematics. For instance, younger students recognize the pattern that exists in the teen numbers; every teen number is written with a 1 (representing one ten) and ends with the digit that is first stated. They also recognize that 3 + 2 = 5 and 2 + 3 = 5
- 8. Look for and express regularity in repeated reasoning. (Inductive Reasoning) Mathematically proficient students see repeated calculations and look for generalizations and shortcuts. In the early grades, students notice repetitive actions in counting and computation, etc. For example, they may notice that the next number in a counting sequence is one more. When counting by tens, the next number in the sequence is ten more (or one more group of ten). In addition, students continually check their work by asking themselves, Does this make sense?

## Summary of Standards for Mathematical Practic

- 1. Make sense of problems and persevere in solving the
- Interpret and make meaning of the probleto find a starting point. Analyze what is given in order to explain to themselve meaning of the problem.
- Plan a solution pathway instead of jumping to a solution.
- Monitor their progress and change the approach if necessary.
- See relationships between various representations.
- Relate current situations to concepts or skills previously learned and connect mathematical ideas to one another.
- Continually ask themsefiv. O" #fi" (Łi'! Žfi'fi'fi-1 Can understand various approaches to solutions.
- 2. Reason abstractly and quantitatively
- · Make sense of quantities and their relationships.
- Decontextualize (represent a sitf(z)-2(e)(o)-3()-2(08b3(g t)-3()

## Questionsto Develop MathematicalThinking

Howwould you describe the problem in your own words? How would you describe what you are trying to find? What do you notice about...?

What informationis given in the problem?

Describe the elationship between the quantities.

What steps in the process are you most confident about? What are some other strategies you might try?

What are some other problems that are simito this one? How might you use one of your previous problems to help you begin?

How else might you organize...represent... show...



In Kindergarten, instructional time should focus on two critical areas: (1) representing and comparing whole numbers, initially with sets of objects; (2) describing shapes and space. More learning time in Kindergarten should be devoted to number than to other topics.

1) Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects; comparing sets or numerals; and modeling simple joining and separating situations with sets of objects, or eventually with equations such as 5 + 2 = 7 and 7 - 2 = 5. (Kindergarten students should see addition and subtraction eq

Cluster: Know number names and the count sequence

Standards: K.CC.1

1. Count to 100 by ones and by tens.

## <u>Standards for Mathematical Practice (SMP) to be emphasized:</u>

MP.6 Attend to precision

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.

#### Explanations and Examples:

K.CC.1 The emphasis of this standard is on the counting sequence. When counting by ones, students need to understand that the next number in the sequence is one more. When counting by tens, the next number in the sequence is ten more (or one more group of ten). Students are to rote count (verbal saying of numbers in sequence) by starting at one and count to 100. (They are only expected to master counting on the decade (0, 10, 20, 30, 40 ...). This objective does not require recognition of numerals. It is focused on the rote number sequence.

Provide settings that connect mathematical language and symbols to the everyday lives of kindergarteners. Support students' ability to make meaning and mathematize (the process of seeing and focusing on the mathematical aspects and ignoring the nonmathematical aspects.

Mathematizing in K indergarten: Sol ving problems, Communicating or showing their thinking, Connecting and Representing Ideas) the real world. Help them see patterns, make connections and provide repeated experiences that give students time and opportunities to develop understandings and increase fluency. Encourage students to explain their reasoning by asking probing questions such as How do you know? How did you figure that out?

Instruction on the counting sequence should be scaffolded (e.g. 1-10, then 1-20, etc.)

Counting should be reinforced throughout the day, not in isolation. (Meaningful Counting) Examples:

- x Count the number of chairs of the students who are absent
- x Count the number of stairs, shoes, etc.
- x Counting groups of ten such as fingers in the classroom (ten fingers per student).
- x Count the number of students in a group.
- x Count the number of specific object they have in their desk (e.g. crayons)

When counting orally, students should recognize the patterns that exist from 1 to 100. They should also recognize the patterns that exist when counting by 10s. Have students verbalize the patterns they see.

Accurate in counting depends on three things:

- 1. Knowing the patterns in the number-word list so that a correct number-word list can be said
- 2. Correctly assigning one number word to one object (one-to one-correspondence)
- 3. Keeping track of which objects have already been counted so that they are not counted more than once.

#### Continued next page

Keeping tract—differentiating counted from uncounted entities—is more easily done by moving

Cluster: Know number names and the count sequence.

Standard: K.CC.3

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).

## Standards for Mathematical Practice (SMP) to be emphasized:

MP.2 Reason abstractly and quantitatively.

MP.6 Attend to precision

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.

#### Connections:

This cluster is connected to the Kindergarten Critical Area of Focus # 1, Representing and comparing whole numbers, initially with sets of objects.

This cluster is connected to the other clusters in the Counting and Cardinality Domain and to Classify objects and count the number of objects in each category in Kindergarten, and to Add and subtract within 20 and Extend the counting sequence in Grade 1.

K.CC.4; KNBT.1; K.MD.3

#### **Explanations and Examples:**

K.CC.3 asks for students to represent a set of objects with a written numeral. The number of objects being recorded should not be greater than 20. Students can record the quantity of a set by selecting a number card/tile (numeral recognition) or writing the numeral. Students can also create a set of objects based on the numeral presented.

Students should be given multiple opportunities to count objects and recognize that a number represents a specific quantity. Once this is established, students begin to read and write numerals (numerals are the symbols for the quantities). The emphasis should first be on quantity and then connecting quantities to the written symbols.

- x A sample unit sequence might include:
  - 1. Counting up to 20 objects in many settings and situations over several weeks.
  - 2. Beginning to recognize, identify, and read the written numerals, and match the numerals to given sets of objects.
  - 3. Writing the numerals to represent counted objects.

connect the representation to the symbol 14.

x Since the teen numbers are not written as they are said, teaching the teen numbers as one group of ten and extra ones is foundational to understanding both the concept and the symbol that represents each teen number. For example, when focusing on the number 14, students should count out fourteen objects using one-to-one correspondence and then use those objects to make one group of ten and four extra ones. Students should

#### Common Misconceptions:

K.CC.3 addresses the writing of numbers and using the written numerals (0-20) to describe the amount of a set of objects. Due to varied development of fine motor and visual development, a reversal of numerals is anticipated for a majority of the students. While reversals should be pointed out to students, the emphasis is on the use of numerals to represent quantities rather th 1 0 0 1B3.24 13489[th]5(1)(si)ETQnd usin6(i)051 0 0 1B3.24 184890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]55(.24)(ts)4890[th]5

## Kindergarten

Cluster: Count to tell the number of objects.

Standard: K.CC.4

- 4. Understand the relationship between numbers and quantities; connect counting to cardinality.
- 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.
- 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.
- c) Understand that each successive number name refers to a quantity that is one larger.

#### Standards for Mathematical Practice (SMP) to be emphasized:

- MP.2 Reason abstractly and quantitatively.
- MP.6 Attend to precision
- MP.7 Look for and make use of structure.
- MP 8 Look for and express regularity in repeated reasoning.

#### Connections:

This cluster is connected to the Kindergarten Critical Area of Focus #1, Representing and comparing whole numbers, initially with sets of objects. This cluster is connected to the other clusters in the Counting and Cardinality Domain and to Classify objects and count the number of objects in each category in Kindergarten, and to Add and subtract within 20 in Grade 1.

#### Explanations and Examples:

K.CC.4 asks students to count a set of objects and see sets and numerals in relationship to one another, rather than as isolated numbers or sets. These connections are higher-level skills that require students to analyze, to reason about, and to explain relationships between numbers and sets of objects. This standard should first be addressed using numbers 1-5 with teachers building to the numbers 1-10 later in the year. The expectation is that students are comfortable with these skills with the numbers 1-10 by the end of Kindergarten.

K.CC.4a reflects the ideas that students implement correct counting procedures by pointing to one object at a time (one-to-one correspondence) using one counting word for each object (one-to-one touching/synchrony), while keeping track of objects that have and have not been counted. This is the foundation of counting.



Cluster: Count to tell the number of objects.

Standard: 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.

## Standards for Mathematical Practice (SMP) to be emphasized:

MP.2 Reason abstractly and quantitatively.

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.

#### Connections:

See K.CC.4 above

Explanations and Examples:

Cluster: Compare numbers

Standard: K.CC.7 Compare two numbers between 1 and 10 presented as written

numerals.

#### Standards for Mathematical Practice (SMP) to be emphasized:

MP. 2 Reason abstractly and quantitatively.

MP. 6 Attend to precision

MP. 7 Look for and make use of structure.

MP. 8 Look for and express regularity in repeated reasoning

#### Connections:

This cluster is connected to the Kindergarten Critical Area of Focus # 1, Representing and comparing whole numbers, initially with sets of objects. More information about this critical area of focus can be found by clicking here. This cluster is also connected to Work with numbers 11-19 to gain foundations for place value in Kindergarten, and to all clusters in the Operations and Algebraic Thinking Domain in Grade 1.

### **Explanations and Examples:**

K.CC.7 calls for students to apply their understanding of numerals 1-10 to compare one from another. Thus, looking at the numerals 8 and 10, a student must be able to recognize that the numeral 10 represents a larger quantity than the numeral 8. Students should begin this standard

# Kindergarten Counting and Cardinality (CC.4-7) Extended Common Core State Standards Mathematics North Carolina DOE

Count to tell the number of objects.		Count to	Count to tell the number of objects.		
	4.	Understand the relationship bie>* ns.	-‡ŽŽ ò •f•›ó		
			quantity		

## Domain: Operations and Algebraic Thinking (OA)

Cluster: Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. All standards in this cluster should only include numbers through 10 Students will model simple joining and separating situations with sets of objects, or eventually with equations such as 5 + 2 = 7 and 7 - 2 = 5. (Kindergarten students should see addition and subtraction equations. Student writing of equations in kindergarten is encouraged, but it is not required.) Students choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away.

Standard: K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. (Drawings need not show details, but should show the mathematics in the problems. This applies wherever drawings are mentioned in the Standards.)

## <u>Standards for Mathematical Practice (SMP) to be emphasized:</u>

MP. 1 Make sense of problems and persevere in solving them.

MP. 2

#### <u>Common Misconceptions:</u>

Students may over-generalize the vocabulary in word problems and think that certain words indicate solution strategies that must be used to find an answer. They might think that the word more always means to add and the words take away or left always means to subtract. When students use the words take away to refer to subtraction and its symbol, teachers need to repeat students' ideas using the words minus or subtract . For example, students use addition to solve this Take from/Start Unknown problem: Melisa took the 8 stickers she no longer wanted and gave them to Anna. Now Melisa has 11 stickers left . How many stickers did Melisa have to begin with?

Note on vocabulary: The term total should be used instead of the term sum. Sum sounds the same as some, but has the opposite meaning. Some is used to describe problem situations with one or both addends unknown, so it is better in the earlier grades to use total rather than sum. Formal vocabulary for subtraction ( minuend and subtrahend ) is not needed in Kindergarten. ( total and addend are sufficient for classroom discussion).

Students should be encouraged to use create drawings /pictorial representations of the problems and/or situation.

If students progress from working with manipulatives to writing numerical expressions and equations, and they skip using pictorial thinking students will then be more likely to use finger counting and rote memorization for work with addition and subtraction.

Counting forward builds to the concept of addition while counting back leads to the concept of subtraction. However, counting is an inefficient strategy. Teachers need to provide instructional experiences so that students progress from the concrete level, to the pictorial level, then to the abstract level when learning mathematical concepts. (Concrete, Representational, Abstract CRA)

Just knowing the basic facts is not enough. We need to help students develop the ability to quickly and accurately understand the relationships between numbers. They need to make sense of numbers as they find and make strategies for joining and separating quantities

Arizona & NC DOE

Domain: Operations and Algebraic Thinking (OA)

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

Standard: K.OA.2. Solve addition and subtraction word problems, and add and subtract

Domain: Operations and Algebraic Thinking (OA)

#### Example 3:

The student snaps ten cubes together to make a train.

- x Student breaks the train into two parts. S/he counts how many are in each part and record the associated equation  $(10 = \_\_+ \_\_)$ .
- x Student breaks the train into two parts. S/he counts how many are in one part and determines how many are in the other part without directly counting that part. Then s/he records the associated equation (if the counted part has 4 cubes, the equation would be 10 = 4 + \_\_\_).
- x Student covers up part of the train, without counting the covered part. S/he counts the cubes that are showing and determines how many are covered up. Then s/he records the associated equation (if the counted part has 7 cubes, the equation would be 10 = 7 + \_\_\_).

#### Example 4:

The student tosses ten two-color counters on the table and records how many of each color are facing up.

#### Instructional Strategies for K.OA. 1-5:

It is essential to provide contextual situations for addition and subtraction that relate to the everyday lives of kindergarteners. A variety of situations can be found in children's literature books. Students then model the addition and subtraction using a variety of representations such as drawings, sounds, acting out situations, verbal explanations and numerical expressions. Manipulatives, like two-color counters, clothespins on hangers, connecting cubes and stickers can also be used for modeling these operations. Kindergarten students should see addition and subtraction equations written by the teacher. Although students might struggle at first, teachers should encourage them to try writing the equations. "ing the "A" s.s.

Domain: Operations and Algebraic Thinking (OA)

Cluster:

Standard: K.OA.5 Fluently add and subtract within 5.

#### Standards for Mathematical Practice (SMP) to be emphasized:

- MP.2 Reason abstractly and quantitatively.
- MP.6 Attend to precision
- MP.7 Look for and make use of structure.
- MP.8 Look for and express regularity in repeated reasoning.

#### Connections:

See K.OA .1

#### **Explanations and Examples:**

K.OA.5 uses the word fluently, which means accuracy (correct answer), efficiency (a reasonable amount of steps), and flexibility (using strategies such as the distributive property and/or those shown below). Fluency is developed by working with many different kinds of objects over an extended amount of time. This objective does not require students to instantly know the answer. Traditional flash cards or timed tests have not been proven as effective instructional strategies for developing fluency.

This standard focuses on students being able to add and subtract numbers within 5. Adding and subtracting fluently refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently.

Strategies students may use to attain fluency include:

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Domain: Number and Operations in Base Ten (NBT)

Cluster: Work with numbers 11-19 to gain foundations for place value.

Standard: 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

Teaching the teen numbers as one group of ten and extra ones is foundational to understanding both the concept and the symbol that represent each teen number. For example, when focusing on the number 14, students should count out fourteen objects using one-to-one correspondence and then use those objects to make one group of ten ones and four additional ones. Students should connect the representation to the symbol 14. Students should recognize the pattern that exists in the teen numbers; every teen number is written with a 1 (representing one ten) and ends with the digit that is first stated.

#### Instructional Strategies:

Kindergarteners need to understand the idea of <u>a ten</u> so they can develop the strategy of adding onto 10 to add within 20 in Grade 1. Students need to construct their own base-ten ideas about quantities and their symbols by connecting to counting by ones. They should use a variety of manipulatives to model and connect equivalent representations for the numbers 11 to19. For instance, to represent 13, students can count by ones and show 13 beans. They can anchor to five and show one group of 5 beans and 8 beans or anchor to ten and show one group of 10 beans and 3 beans. Students need to eventually see a ten as different from 10 ones.

After the students are familiar with counting up to 19 objects by ones, have them explore different ways to group the objects that will make counting easier. Have them estimate before they count and group. Discuss their groupings and lead students to conclude that grouping by ten is desirable. 10 ones make 1 ten makes students wonder how something that means a lot of things can be one thing. Students need to first use groupable materials to represent numbers 11 and 19 because a group of ten such as a bundle of 10 straws or a cup of 10 beans makes more sense than a ten in pre-grouped materials. They need to see that there are 10 single objects represented on the item for ten in pre-grouped materials, such as the rod in base-ten blocks. Students need to learn to attach words to materials and groups and understand what they represent. Eventually, they need to see the rod as a ten that they did not group themselves.

Students should impose their base-ten concepts on a model made from groupable and pre-groupable materials

Domain: Measure and Data (MD)

Cluster: Describe and compare measureable attributes.

Standard: K. MD.1 Describe measureable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

## Standards for Mathematical Practice (SMP) to be emphasized:

MP.4 Model with mathematics

MP.5 Use appropriate tools strategically

MP.6 Attend to precision

MP.7 Look for and make use of structure

Connections:

Domain: Measure and Data (MD)

Cluster: Describe and compare measureable attributes.

Standard: K. MD.2 Directly compare two objects with a measurable attribute in common, to see which object has more of / less of the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.

## Standards for Mathematical Practice (SMP) to be emphasized:

- MP.2 Reason abstractly and quantitatively
- MP.4 Model with mathematics
- MP.6 Attend to precision
- MP.7 Look for and make use of structure.

#### Connections:

This cluster is connected to the Kindergarten Critical Area of Focus #1, Representing and comparing whole numbers, initially with sets of objects.

This cluster is connected to Measure lengths indirectly and by iterating length units

in Grade 1

#### **Explanations and Examples:**

K.MD.2 asks for direct comparisons of objects. Direct comparisons are made when objects are put next to each other, such as two children, two books, two pencils. For example, a student may line up two blocks and say, This block is a lot longer than this one. Students are not comparing objects that cannot be moved and lined up next to each other.

When making direct comparisons for length, students must attend to the starting point of each object and recognize that objects should be matched up at the end of objects to get accurate measurements. For example, the ends need to be lined up at the same point, or students need to compensate when the starting points are not lined up (conservation of length includes understanding that if an object is moved, its length does not change; an important concept when comparing the lengths of two objects). Since this understanding requires conservation of length, a developmental milestone for young children, children need multiple experiences to move beyond the idea that .... 36 Roetimes this block is longer than WKLV RQH DQG VRRMWIEPHV LV (depending on how I OD\ WKHP VLGH E\ VL&HRNDQGG WKDW FORFN LV DOZD\ EORFN ZLWK HDFK HQG OLQHG XS DSSURSULDWHO\

Before conservation of length: The blue block is longer than the plain block when they are lined up like this. But when I move the blocks around, sometimes the plain block is longer than the blue block.

After conservation of length: I have to line up the blocks to measure them.

Language plays an important role in this standard as students describe the similarities and differences of measurable attributes of objects (e.g., shorter than, taller than, lighter than, the same as, etc.).

Students should have many opportunities to compare the lengths of two objects both directly (by comparing them with each other) and indirectly (by comparing both with a third objects.

#### Common Misconceptions:

Many students have difficulty understanding that when an object is moved away from the object they are comparing it with, the length does not change. With multiple opportunities, students learn that they have to line up the items they are comparing and/or measuring. (Conservation of Length: includes understanding that if an object is moved, its length does not change; an important concept when comparing the lengths of two objects).

Arizona, Ohio & NC DOE

Domain: Measure and Data (MD)

Cluster: Classify objects and count the number of objects in each category.

Standard: K.MD.3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. (Limit category counts to be less than or equal to 10)

## Standards for Mathematical Practice (SMP) to be emphasized:

MP.2 Reason abstractly and quantitatively

MP.6 Attend to precision

MP.7 Look for and make use of structure.

#### Connections:

This cluster is connected to the Kindergarten Critical Area of Focus #1, Representing and comparing whole numbers, initially with sets of objects.

This cluster is connected to Know number names and the count sequence and Count to tell the number of objects in Kindergarten, and to Represent and interpret data in Grade 1.

Explanations and Examples:

## Kindergarten Measurement and Data Extended Common Core State Standards Mathematics North Carolina DOE

Common Core State Standards	Essence	Extended Common Core
Describe and compare measurable attributes.	Measureable attributes of	Describe and compare measurable attributes.
1. Describe measurable attributes of objects,	length	·

- Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.
- Directly compare two objects with a measurable attribute in common, to see
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Resources:		

Domain: Geometry (G)

Domain: Geometry (G)

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

Standard: K.G.2. Correctly

Children also need to see examples of shapes beyond circles, squares, rectangles, and triangles.

Domain: Geometry (G)

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

Standard: K.G.3. Identify shapes as two-dimensional (lying in a plane, flat ) or three dimensional (solid).

#### Standards for Mathematical Practice (SMP) to be emphasized:

MP.6 Attend to precision

MP.7 Look for and make use of structure.

#### Connections:

This cluster is connected to the Kindergarten Critical Area of Focus #2, Describing shapes and space.

This cluster is connected to Analyze, compare, create and compose shape

s in Kindergarten, and to Reason with shapes and their attributes

in Grade 1.

### **Explanations and Examples:**

K.G.3. asks students to identify two-dimensional (flat objects) and three-dimensional (solid objects). This standard can be done by having students sort 2-dimensional and 3-dimensional objects, or by having students describe the appearance or thickness of shapes.

A final type of relationship between shapes that is very important is the difference between two-dimensional (flat) and three-dimensional shapes.

Student should be able to differentiate between two dimensional and three dimensional shapes.

- x Student names a picture of a shape as two dimensional because it is flat and can be measured in only two ways (length and width).
- x Student names an object as three dimensional because it is not flat (it is a solid object/shape) and can be measured in *three* different ways (length, width, height/depth).

This allows children to see that even with two right triangles made from a square, they can put these together to make a triangle or a parallelogram.

Kindergartners can develop the ability to intentionally and systematically combine shapes to make new shapes and complete puzzles. They do so with increasing anticipation, on the basis of the shapes' attributes, and thus, children developmental imagery of the component shapes. They snow(s)) of (st) of

A significant advance is that they can combine shapes with different properties, extending the pattern block shapes (whose angles are multiples of 30 degrees) common at early levels to such shapes as tangrams (with angles that are m6(0)6()4(d)3(egr)5(ee)-3(s))-2(()5()-6(l)13(ev5gr)5(

#### Common Misconceptions:

One of the most common misconceptions in geometry is the belief that orientation is tied to shape. A student may see the first of the figures below as a triangle, but claim to not know the name of the second.

Students need to have many experiences with shapes in different orientations. For example, in the Just Two Triangles activity, ask students to form larger triangles with the two triangles in different orientations.

Another misconception is confusing the name of a two-dimensional shape with a related three-dimensional shape or the shape of its face. For example, students might call a cube a square because the student sees the face of the cube.

It is important when students are exploring 2-dimensional shapes (flat) that the shapes they are working with are on paper or other FLAT material.

Arizona, Ohio & NC DOE

Domain: Geometry (G)

Cluster:

Analyze, compare, create, and compose shapes.

Standard: K.G.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

## Standards for Mathematical Practice (SMP) to be emphasized:

MP.1 Make sense of problems and persevere in solving them.

MP.4 Model with mathematics.

MP.7 Look for and make use of structure.

Connections:

Cluster: Analyze, compare, create, and compose shapes.

Standard: 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?

## Standards for Mathematical Practice (SMP) to be emphasized:

MP.1 Make sense of problems and persevere in solving them.

MP.3 Construct viable arguments and critique the reasoning of others.

MP.4 Model with mathematics.

MP.7 Look for and make use of structure.

#### Connections:

(See K.G.1 earlier)

## **Explanations and Examples:**

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## Kindergarten Geometry Extended Common Core State Standards Mathematics North Carolina DOE

Common Core State Standards

Essence

**Extended Common Core** 

Identify and describe shapes (such as squares, circles,

TABLE 1. Common addition and subtraction situations.

_				
			grass. Some more bunnies hop	Some bunnies were sitting on the grass. Three more bunnies hop there. Then there were five bun How many bunnies were on the grass before?  ? + 3 = 5
I	Take from	Five apples were on the table. I two apples. How many apples the table now?  5 22 = ?		

<sup>34</sup>Adapted from Box42xfMathematics Learning in Early Childhaticonal Research Council (2009, pp. 32, 33).

and apted from Box 2011/lathematics Learning in Early Childrandom, al Research Council (2009, pp. 32, 33).

35 Theseake aparituations can be used to show all the decompositions of a given number. The associated equations, we held to we will be used to show all the decompositions of a given number. The associated equations, we held to we will be used to show all the decompositions of a given number. The associated equations, we held to we will be used to show all the decompositions of a given number. The associated equations, we held to we will be used to show all the decompositions of a given number. The associated equations, we held to we will be used to show all the decompositions of a given number. The associated equations, we held to we will be used to show all the decompositions of a given number. The associated equations, we held to we will be used to show all the decompositions of a given number. The associated equations, we held to show all the decompositions of a given number. The associated equations, we held to show all the decompositions of a given number. The associated equations, we held to show all the decompositions of a given number. The associated equations, we held to show all the decompositions of a given number. The associated equations, we held to show all the decompositions of a given number. The associated equations, we held to show all the decompositions of a given number. The associated equations, we held to show all the decompositions of a given number. The associated equations, we held to show all the decompositions of a given number. The associated equations, we held the associated equations are the show all the decompositions of the associated equations are the show all the decompositions are the show all the show all the decompositions are the show all the decompositions are the show all the decompositions are the show all the show all the show all the show all the show all

<sup>&</sup>lt;sup>37</sup> For the Biggenknown or Smaller Unknown situations, one version directs the correct operation (thmentersitors bisjoer unknown and lessing for the smaller unknown). The other versions are more difficult.