Kentucky Academic Standards for Mathematics: Kindergarten Overview

Counting/Cardinality (CC)	Operations/Algebraic Thinking (OA)	Number and Operations in Base Ten (NBT)	Measurement and Data (MD)	Geometry (G)
• Know number names and the count sequence. • Count to tell the number of objects. • Compare numbers.	• Understand addition as putting together and adding to and understand subtraction as taking apart and taking from.	• Work with numbers 11-19 to gain foundations for place value.	• Describe and compare measurable attributes. • Classify objects and count the number of objects in each category. • Identify coins by name.	• Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders and spheres). • Analyze, compare, create and compose shapes.

In grade K, instructional time should focus on two critical areas:

1. In the Counting and Cardinality and Operations and Algebraic Thinking domains, students will:

- develop a more formal sense of numbers;
- 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. Note: Kindergarten students should see addition and subtraction equations and student writing of equations in kindergarten is encouraged, but it is not required; and
- 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.

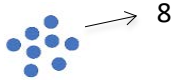
2. In the Geometry and Measurement and Data domains, students will:

- describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and appropriate vocabulary;
- identify, name and describe basic two-dimensional shapes, such as squares, triangles, circles, rectangles and hexagons, presented in a variety of ways (e.g., with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders and spheres; and
- use basic shapes and spatial reasoning to model objects in their everyday environment to create and compose more complex shapes.

Note: More learning time in Kindergarten should be devoted to number than to other topics.

Counting and Cardinality	
Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. 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. MP.8. Look for and express regularity in repeated reasoning.
Cluster: Know number names and the count sequence.	
Standards	**Clarifications**
KY.K.CC.1 Count a. Count to 100 by ones and by tens. b. Count backwards from 30 by ones. **MP.7**, **MP.8**	Students verbally count forward by ones (1,2,3,4. . .) to 100 Students verbally count forward by tens (10, 20, 30. . .) to 100. Students verbally count backwards by ones (30, 29, 28, 27. . .) from 30. Coherence KY.K.CC.1→KY.1.NBT.1
KY.K.CC.2 Count forward beginning from a given number within the known sequence within 100 (instead of having to begin at 1). **MP.7**	Students verbally count forward starting at a number other than one (58, 59, 60, 61, 62. . .) within 100. Coherence KY.K.CC.2→KY.1.NBT.1
KY.K.CC.3 Represent numbers. a. Write numbers from 0 to 20. b. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects). **MP.2**, **MP.7**, **MP.8**	Students write all numerals in the range of 0-20 (1, 2, 3, 4, 5…) When students are given a written numeral, represent with objects within 20 (4… ★ ★ ★ ★). Coherence KY.K.CC.3→KY.1.NBT.1
Attending to the Standards for Mathematical Practice	
Students notice repetition inherent in the counting sequence as they count to one hundred by ones and tens. For example, students notice “seven” follows “six,” and “twenty-seven” follows “twenty-six” (**MP.8**). They describe how this pattern exists into new decade families. For example, thirty-seven follows thirty-six and so on. Students use this general pattern about how numbers are structured to count forward from any given number within the range of 0-100 (counting on) without the benefit of starting at “one” (**MP.7**). When counting objects within the range of 0-20, they understand they can communicate this total using words, for example “ten” and the numeral 10. (**MP.2**)	

The identified mathematical practices, coherence connections and clarifications are possible suggestions; however, they are not the only pathways.

Counting and Cardinality	
Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. 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. MP.8. Look for and express regularity in repeated reasoning.
Cluster: Count to tell the number of objects.	
Standards	**Clarifications**
KY.K.CC.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. **MP.2, MP.8**	Students understand each object being counted is given only one number name and this naming occurs in the correct sequence (one, two, three, four. . .). Once students concluded counting a group of objects in different arrangements, the student correctly identifies the amount of objects in that group (rather than recounting the group). Students verbally count by ones, connecting each number word with a quantity (or collection) as the count progresses. Coherence KY.K.CC.4→KY.1.OA.5
KY.K.CC.5 Given a number from 1-20, count out that many objects. a. Count to answer "how many?" questions with as many as 20 things arranged in a line, a rectangular array, or a circle. b. Count to answer "how many?" questions with as many as 10 things in a scattered configuration. **MP.2, MP.3**	When presented with a numeral (in the range of 1-20), the student creates a collection of a like amount. When presented with a collection (in the range of 1-20) the student connects that collection to the correct numeral. When presented with collections in structured arrangements (line, circle, array and others) the student determines the quantity of that collection by counting.  When presented with collections in an unstructured arrangement the student determines the quantity of that collection by counting.  Coherence KY.K.CC.5→KY.1.NBT.1

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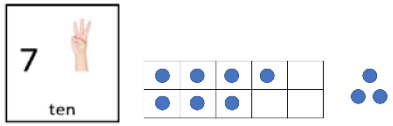
Attending to the Standards for Mathematical Practice
Students connect number words to quantities as they count collections of ten by ones and realize the last number stated in the sequence (“ten”) refers to the total quantity of objects (cardinality). For example, when students count five blocks, the last word they say is “five” and therefore five is the total number of the collection (**MP.2**). Through repeated experiences of adding one counter to an existing collection, students see that the total is one more and know this is true every time another counter is added (**MP.8**). When encountering a collection of objects in various configurations (see clarification), students organize the objects in order to count each one only once and explain their strategy for counting and for ensuring they have counted each object once (**MP.2**, **MP.3**).

Counting and Cardinality	
Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. 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. MP.8. Look for and express regularity in repeated reasoning.
Cluster: **Compare numbers.**	
Standards	**Clarifications**
KY.K.CC.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group. **MP.1**, **MP.3**, **MP.6**	Compare two collections (each containing up to 10 objects) to determine whether one collection is greater than, less than, or equal to the other. Students use matching strategies (pairing items from the collections) or counting strategies (counting one collection and then the other). Note: Students do not need to use the relation symbols greater than (>), less than (<) and equal to (=) to compare groups of objects. Coherence KY.K.CC.6→KY.K.MD.3
KY.K.CC.7 Compare two numbers between 1 and 10 presented as written numerals. **MP.2**	When presented with two numerals (between 1 and 10), students determine which numeral is greater than, less than, or equal to the other. Students express some mathematical reasoning regarding their determination (5 is larger than 3 because it has two more). Note: Students do not need to use the relation symbols greater than (>), less than (<) and equal to (=) to compare numbers between 1 and 10. Coherence KY.K.CC.7→KY.1.NBT.3
Attending to the Standards for Mathematical Practice	
Students know different strategies for comparing groups and choose a strategy such as counting, matching and pairing to compare two groups (**MP.1**). For example, when comparing a collection of red counters to a collection of blue counters, students count each group finding which has the greater number, pair off blues and reds to see which group has extras, or make two rows and line them up to see which is longer (**MP.2**). Once a determination has been made, students articulate their ideas using precise mathematical language such as “greater than,” “less than,” and “equal to” (**MP.6**, **MP.3**). When comparing two numerals, students move flexibly between symbols and their corresponding quantities, using objects or situations to help them reason about the relative size of each quantity (**MP.2**).	

Operations and Algebraic Thinking	
Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. 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. MP.8. Look for and express regularity in repeated reasoning.
Cluster: **Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.**	
Standards	**Clarifications**
KY.K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings, sounds, acting out situations, verbal explanations, expressions, or equations. **MP.2**, **MP.4**	Students flexibly model or represent addition and subtraction tasks across a range of contexts rather than just becoming proficient with a single model or representation. **See Table 1 in Appendix A.** Note: Drawings need not show detail but should accurately represent the quantities involved in the task. Coherence KY.K.OA.1→KY.K.OA.2
KY.K.OA.2 Solve addition and subtraction word problems and add and subtract within 10 by using objects or drawings to represent the problem. **MP.5**	Students flexibly model or represent addition and subtraction situations or context problems (involving sums and differences up to 10). **See Table 1 in Appendix A.** Note: Drawings need not show detail but accurately represent the quantities involved in the task. Coherence KY.K.OA.2→KY.1.OA.1
KY.K.OA.3 Decompose numbers less than or equal to 10. a. Decompose numbers into two groups in more than one way by using objects or drawings and record each decomposition by a drawing or equation. b. Use objects or drawings to demonstrate equality as the balancing of quantities. **MP.2**, **MP.4**	When presented with a numeral or collection (10 or less), the student separates that amount into two groups or collections via drawings or objects. Note: Drawings need not show detail, but accurately represent the quantities involved in the task.  Students represent an equation as the balance of quantities. Note: Drawings need not show detail, but accurately represent the quantities involved in the task.

Standards	Clarifications
	 Coherence KY.K.OA.3→KY.1.OA.6
KY.K.OA.4 For any number from 1 to 9, find the number that makes 10 when added to the given number by using objects or drawings and record the answer with a drawing or equation. **MP.7**, **MP.8**	When presented with a numeral or collection of objects between 1-9, represent the corresponding number that makes 10 with objects or drawings. Students record these combinations using either drawings or numbers. Drawings need not show detail, but accurately represent the quantities involved in the task.  Coherence KY.K.OA.4→KY.1.OA.6
KY.K.OA.5 Fluently add and subtract within 5. **MP.2**, **MP.7**	Students solve addition and subtraction tasks (with sums and differences within 5) efficiently, accurately, flexibly and appropriately. Being fluent means students choose flexibly among methods and strategies to solve contextual and mathematical problems, they understand and explain their approaches and they produce accurate answers efficiently. Students express mathematical reasoning regarding their responses (“5-3 equals 2 because when you move three back, you land on two”). Note: Reaching fluency is an ongoing process that will take much of the year. Coherence KY.K.OA.5→KY.1.OA.6

Attending to the Standards for Mathematical Practice
Students use tools and models to interpret, represent and solve word problems. They make sense of addition and subtraction situations by selecting objects to represent the situation (**MP.1**) and represent the situations using an expression or equations (see clarifications) (**MP.4**). For example, students act out a story problem involving the eating of apples using cubes to represent each apple (**MP.5**). Students decomposed numbers into two subgroups in different ways and understand the subgroups do not need to be the same size, but combined they equal to original value (7) (**MP.2**). Students decompose a group of 7 objects into 3 and 4, 6 and 1, and 5 and 2. They write the related expressions (**MP.4**) and explain or show (using a balance or moving objects) these different arrangements are equal to each other and equal to 7 (**MP.2**). Students connect breaking apart 5 into 2 and 3, means 2 + 3 = 5. Beyond counting, students use visuals (dot patterns, five and ten frames) and tools such as counters and Rekenreks to determine sums within 5 and combinations of 10 (**MP.5**, **MP.7**). For example, students view a ten frame displaying 7 counters and see 3 more counters are needed to equal 10, or in seeing the sum 3 + 2 may visualize a dot pattern or notice 3 + 2 is 1 more than 2 + 2, a sum they know (**MP.2**).

Numbers and Operations in Base Ten	
Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. 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. MP.8. Look for and express regularity in repeated reasoning.

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

Standards	Clarifications
KY.K.NBT.1 Compose and decompose numbers from 11 to 19 using quantities (numbers with units) of ten ones and some further ones. Understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones. **MP.3**, **MP.4**, **MP.7**	Using numbers or representations, students use 10 units as an anchor to compose and decompose quantities (up to 19). Note: Drawings need not show detail, but accurately represent the quantities involved in the task. 16 triangles = 10 triangles + ΔΔΔΔΔΔ; 18 beans = 10 beans + 8 beans Coherence KY.K.NBT.1→KY.1.NBT.2

Attending to the Standards for Mathematical Practice

Students explain a teen number can be broken apart into ten ones and some more ones (**MP.3**). They express this relationship using objects, drawings and corresponding equations (**MP.4**). For example, a student working with 16 counters places ten counters in a cup and leaves 6 counters on the table and represents this idea using the equation 16=10+6. Note the language of the standard does not require students to actually create the ten unit (that is in grade 1), but they recognize and break apart a teen number into ten ones and some more ones (**MP.7**).

The identified mathematical practices, coherence connections and clarifications are possible suggestions; however, they are not the only pathways.

Measurement and Data	
Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. 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. MP.8. Look for and express regularity in repeated reasoning.
Cluster: Describe and compare measurable attributes.	
Standards	**Clarifications**
KY.K.MD.1 Describe measurable attributes (length, height, weight, width, depth) of an object or a set of objects using appropriate vocabulary. **MP.3**, **MP.6**	For a single object, students verbally identify more than one attribute measured (wooden block - height, weight). Coherence KY.K.MD.1→KY.1.MD.2
KY.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. **MP.2**, **MP.6**	Students consider and compare a common measurable attribute shared by two objects (Which cup is taller and which is shorter? Which bucket of sand is heavier and which is lighter?). Coherence KY.K.MD.1→KY.1.MD.1
Attending to the Standards for Mathematical Practice	
Students notice objects in the world around them have attributes and some of those attributes are measurable attributes. They describe measurable attributes using measuring language such as "heavy" and/or "long/short" (**MP.3**, **MP.6**). As students compare objects, they focus on a selected attribute, for example, length and then determine which object has more or less of that attribute, saying, this footprint is longer (**MP.2**).	

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Measurement and Data	
Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. 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. MP.8. Look for and express regularity in repeated reasoning.
Cluster: Classify objects and count the number of objects in each category.	
Standards	**Clarifications**
KY.K.MD.3 Classify and sort objects or people by attributes. Limit objects or people in each category to be less than or equal to 10. **MP.3**, **MP.6**	For a group of 10 (or less) objects/people, students compare and order objects according to a common measurable attribute (height, weight, length, width, depth) shared by the objects (arranging 4 blocks from heaviest to lightest; arranging classmates from tallest to shortest). Coherence KY.K.MD.3→KY.1.MD.4
Attending to the Standards for Mathematical Practice	
Students use their understanding of attributes to sort objects in different ways. They justify their rules for sorting, listen to the ideas of others and when they are unsure or disagree, they question or challenge the observations (**MP.3**). As they describe attributes, students use precise shape or measurement language such as “has all straight sides” or “is shorter than a new pencil” (**MP.6**).	

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Measurement and Data	
Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. 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. MP.8. Look for and express regularity in repeated reasoning.

Cluster: **Identify coins by name.**

Standards	Clarifications
KY.K.MD.4 Recognize and identify coins by name (penny, nickel, dime, quarter). **MP.6**	Students identify coins (penny, nickel, dime, quarter) when presented. When shown a nickel, name the coin as a nickel; select a nickel when presented with a group of different coins. Note: Students need not identify the value of these coins. Coherence KY.K.MD.4→KY.1.MD.3b

Attending to the Standards for Mathematical Practice

Students recognize the need for consistent, common language to identify coins (**MP.6**). For example, students understand that "nickel" is the name of a specific coin with a specific appearance and cannot be used to describe other coins of different appearances. Note the standard does not require students to identify values, only names.

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Geometry	
Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. 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. MP.8. Look for and express regularity in repeated reasoning.
Cluster: **Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders and spheres)**.	
Standards	**Clarifications**
KY.K.G.1 Name and describe shapes in the environment. a. Describe objects in the environment using names of shapes. b. Describe the relative positions of these objects using terms *above, below, in front of, behind and next to*. **MP.6**	For objects in student's environment, the student accurately provides a shape name (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders and spheres). ("The clock on the wall is a circle." "The desktop is a rectangle.") Students use positional language to describe the relationships between objects ("The clock is above the bulletin board." "My desk is next to the computer table.") Coherence KY.K.G.1 →KY.K.G.4
KY.K.G.2 Correctly name shapes regardless of orientations or overall size. **MP.7**	Students identify and name shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders and spheres) regardless of size, orientation, or positioning. (The classroom window is a rectangle and this paper is a rectangle, too.) Coherence KY.K.G.2→KY.K.G.4
KY.K.G.3 Identify shapes as two-dimensional or three-dimensional. **MP.3**, **MP.6**	When presented with a shape or object, students determine whether it is two-dimensional (square, circle, triangle, rectangle, or hexagon) or three-dimensional (cube, cone, cylinder, sphere). Students express mathematical reasoning regarding their responses. (The block is three-dimensional because it's thick and not flat like paper.) Coherence KY.K.G.3→KY.1.G.1
Attending to the Standards for Mathematical Practice	
Students use precise language to describe objects they encounter in their world and describe the locations of objects such as "up," "down," "above" and "below", as well as use language to describe characteristics of two- and three-dimensional shapes (**MP.6**). Students explain the location or position of an object does not change its attributes (**MP.7**).	

The identified mathematical practices, coherence connections and clarifications are possible suggestions; however, they are not the only pathways.

Geometry	
Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. 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. MP.8. Look for and express regularity in repeated reasoning.
Cluster: **Analyze**, **compare**, **create and compose shapes.**	
Standards	**Clarifications**
KY.K.G.4 Describe the similarities, differences and attributes of two and three dimensional shapes using different sizes and orientations. **MP.3**, **MP.7**	When considering two-dimensional shapes (square, circle, triangle, rectangle, hexagon) or objects and three dimensional shapes (cube, cone, cylinder, sphere) or objects, students describe similarities, differences and attributes. ("The window and paper are both rectangles, but the window sits sideways and my paper is long ways." "My book and my paper both look like rectangles, but my book is three-dimensional because it is thicker.") Coherence KY.K.G.4→KY.1.G.1
KY.K.G.5 Model shapes in the world by building figures from components and drawing shapes. **MP.1**, **MP.5**	Students construct and draw models of shapes (square, circle, triangle, rectangle, hexagon, cube, cone, cylinder, sphere) in the world around them. Students create shapes with materials that include but are not limited to straws, pipe cleaners, popsicle sticks or clay and describe the shape they create. (Students use sticks and a ball to replicate an ice cream cone.) Coherence KY.K.G.5→KY.1.G.1
KY.K.G.6 Compose simple shapes to form larger shapes. **MP.3**, **MP.5**	Students explore by using simple shapes to construct a larger shape. (Students arrange paper triangles to form a rectangle. Students arrange triangle pattern blocks to form a hexagon.) Coherence KY.K.G.6→KY.1.G.2
Attending to the Standards for Mathematical Practice	
Students use informal language as they compare objects; for example, sorting polygons by their relative size, or by a rule, such as "have three corners" (**MP.6**). Students analyze attributes of three-dimensional shapes; for example, noticing some have sides that all look like squares or rectangles, while others have sides that look like triangles (**MP.3**). Using a variety of tools, students construct objects that resemble items in their world (**MP.5**). As they construct and draw shapes, they recognize they are putting together shapes to form new larger shapes, just as they combine objects to have more objects (**MP.5**). Students analyze and describe shapes they form by combining shapes; for example, using pattern blocks or tangrams to build a design (**MP.3**).	

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