Blackhawk School District

CURRICULUM

Course Title:	**Math**
Grade Level(s):	**Kindergarten**
Length of Course:	**Daily**
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COURSE DESCRIPTION: Kindergarten math instruction will be driven by the 8 standards for mathematical practice and will focus on five components of mathematics. Math instruction will include manipulatives and available technology, when appropriate, as they help students to achieve a better understanding of information while using hands on instruction. Differentiated small group instruction will provide successful learning experiences for kindergarten learners. Elements of math curriculum in kindergarten are used as an introduction to many of the skills necessary for math success in future grade levels.

1. Counting and Cardinality: Students will know number names, count sequence, count to tell number of objects, and compare numbers.
2. Operations and Algebraic Thinking: Students will understand addition as putting together and adding to, and subtraction as taking apart and taking from.
3. Numbers and Operations in Base Ten: Students will work with numbers 11-19 to gain foundations for place value
4. Measurement and Data: Students will describe and compare measureable attributes and classify and count objects in specific categories
5. Geometry: Students will identify and describe shapes and analyze, compare, create, and compose shapes.

Common Core State Standards for Mathematics

Research studies of mathematics education have determined that mathematics curriculum must be more focused and coherent. The Common Core State Standards for Mathematics define what students should understand and be able to do in their study of math. The following Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important 'Processes and proficiencies" with longstanding importance in mathematics education.

1. **Make sense of problems and persevere in solving them.**
   Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems

using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

2. **Reason abstractly and quantitatively.**
   Mathematically proficient students make sense of quantities and their relationships in problem situations. They bringtwo complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize – to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents – and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
3. **Construct viable arguments and critique the reasoning of others.**
   Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about date, making plausible arguments that take into account the context from which the date arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and – if there is a flaw in an argument – explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
4. **Model with mathematics.**
   Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or us a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
5. **Use appropriate tools strategically.**
   Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

6. **Attend to precision.**

   Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

7. **Look for and make use of structure.**

   Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Late, students will see 7 x 8 equals the well-remembered 7 x 5 + 7 x 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 x 7 and the 9 as 2 +7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

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

   Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x +1)$, $(x – 1)(x^3 + x^2 + x +1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Course Outline	Objectives (Common Core Standard)	Further Explanation (Common Core Standard)
Counting and Cardinality	**Know number names and the count sequence.** K.CC.1. Count to 100 by ones and by tens. K.CC.2. Count forward beginning from a given number within the known sequence (instead of having to begin at 1). 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). **Count to tell the number of objects.** K.CC.4. Understand the relationship between numbers and quantities; connect counting to cardinality. -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. -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. -Understand that each successive number name refers to a quantity that is one larger. 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. **Compare numbers.** 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. K.CC.7. Compare two numbers between 1 and 10 presented as written numerals.	Use matching and counting strategies.
Operations and Algebraic Thinking	**Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.** K.OA.1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (claps), acting out situations, verbal explanations, expressions, or equations. K.OA.2. Solve addition and subtraction word problems, and add and subtract within 10. K.OA.3. Decompose numbers less than or equal to 10 into pairs in more than one way. K.OA.4. For any number from 1 to 9, find the number that makes 10 when added to the given number. K.OA.5. Fluently add and subtract within 5.	Use objects or drawings to represent the problem. Use objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1). Use objects or drawings, and record the answer with a drawing or equation.

Numbers and Operations in Base Ten	**Work with numbers 11-19 to gain foundations for place value.** K.NBT.1. Compose and decompose numbers from 11 to 19 into 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.	Use objects or drawings, and record each composition or decomposition by a drawing or equation (such as 18 = 10 + 8).
Measurement and Data	**Describe and compare measurable attributes.** K.MD.1. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. 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. **Classify objects and count the number of objects in each category.** K.MD.3. Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.	Directly compare the heights of two children and describe one child as taller/shorter.
Geometry	**Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).** K.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to. K.G.2. Correctly name shapes regardless of their orientations or overall size.	

	K.G.3. Identify shapes as two-dimensional (lying in a plane, “flat”) or three-dimensional (“solid”). **Analyze, compare, create, and compose 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., and other attributes (e.g., having sides of equal length). K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes. K.G.6. Compose simple shapes to form larger shapes.	“Can you join these two triangles with full sides touching to make a rectangle?”