Blackhawk School District

CURRICULUM

Course Title: Math 3
Grade Level(s): Third
Length of Course: Year
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COURSE DESCRIPTION: Students who achieve these mathematical anchors will be able to communicate mathematically in the real world. The students will demonstrate an understanding of numbers, ways of representing numbers relationships among numbers and number systems. They will learn to apply appropriate techniques, tools and formulas to determine measurements. Students will analyze and understand the characteristics and properties of two- and three- dimensional geometric shapes. Students will also learn to formulate, organize, display, interpret or analyze data and also apply the basic concepts of probability or outcomes.

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.

Unit Breakdown	Objectives	PA Common Core Standards
Number and Operations in Base Ten	**Place Value to Perform Operations:** ***M03.A-T.1.1 Apply place value strategies to solve problems.*** • Round two- and three-digit whole numbers to the nearest ten or hundred, respectively. • 2 Add two- and three-digit whole numbers (limit sums from 100 through 1,000), and/or subtract two- and three-digit numbers from three-digit whole numbers. • Multiply one-digit whole numbers by two-digit multiples of 10 (from 10 through 90). • Order a set of whole numbers from least to greatest or greatest to least (up through 9,999; limit sets to no more than four numbers).	• M03.A-T.1.1.1 • M03.A-T.1.1.2 • M03.A-T.1.1.3 • M03.A-T.1.1.4
Numbers and Operations- Fractions	**Understanding Fractions as Numbers:** ***M03.A-F.1.1 Develop and apply number theory concepts to compare quantities and magnitudes of fractions and whole numbers.*** • Demonstrate that when a whole or set is partitioned into y equal parts, the fraction 1/y represents 1 part of the whole and/or the fraction x/y represents x equal parts of the whole (limit the denominators to 2, 3, 4, 6, and 8; limit numerators to whole numbers less than the denominator; no simplification necessary). • Represent fractions on a number line (limit the denominators to 2, 3, 4, 6, and 8; limit numerators to whole numbers less than the denominator; no simplification necessary). • Recognize and generate simple equivalent fractions (limit the denominators to 1, 2, 3, 4, 6, and 8; limit numerators to whole numbers less than the denominator). • Express whole numbers as fractions, and/or generate fractions that are equivalent to whole numbers (limit the denominators to 1, 2, 3, 4, 6, and 8). • Compare two fractions with the same denominator (limit the denominators to 1, 2, 3, 4, 6, and 8), using the symbols >, =, or <, and/or justify the conclusions.	• M03.A-F.1.1.1 • M03.A-F.1.1.2 • M03.A-F.1.1.3 • M03.A-F.1.1.4 • M03.A-F.1.1.5
Operations and Algebraic Thinking	**Represent and solve problems involving multiplication and division:** ***M03.B-O.1.1 Understand various meanings of multiplication and division.*** • Interpret products as a total of whole numbers (up to and including 10 X 10) • Interpret and/or describe whole number quotients of whole numbers. (limit dividends through 50, and limit divisors and quotients through 10.) ***M03.B-O.1.2 Solve mathematical and real-world problems using multiplication and division, including determining the missing number in a multiplication and/or division equation.*** • Use multiplication (up to and including 10 × 10) and/or division (limit dividends through 50, and limit divisors and quotients through 10) to solve word problems in situations involving equal groups, arrays, and/or measurement quantities. • Determine the unknown whole number in a multiplication (up to and including 10 × 10) or division (limit dividends through 50, and limit divisors and quotients through 10) equation relating three whole numbers.	• M03.B-O.1.1.1 • M03.B-O.1.1.2 • M03.B-O.1.2.1 • M03.B-O.1.2.2

	Understand Properties of Multiplication and Relationship Between Multiplication and Division: ***M03.B-O.2.1 Use properties to simplify and solve multiplication problems.*** • Apply the properties of operations as strategies to multiply and divide. (Commutative, Associative, and Distributive Properties) ***M03.B-O.2.2 Relate division to a missing-number multiplication equation.*** • Interpret and/or model division as a multiplication equation with an unknown factor. **Solve Problems Involving Operations, and Identify and Explain Patterns:** ***M03.B-O.3.1 Use operations, patterns, and estimation strategies to solve problems.*** • Solve two-step word problems with variables using any of the four operations. Assess reasonableness of answers using mental computation and estimation strategies including rounding. • Represent two-step word problems using equations with a symbol standing for the unknown quantity. Limit to problems with whole numbers and having whole-number answers. • Assess the reasonableness of answers. Limit problems posed with whole numbers and having whole-number answers. • Solve two-step equations using order of operations (equation is explicitly stated with no grouping symbols). • Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. • Create or match a story to a given combination of symbols (+, –, ×, ÷, <, >, =) and numbers. • Identify the missing symbol (+, –, ×, ÷, <, >, =) that makes a number sentence true.	• M03.B-O.2.1.1 • M03.B-O.2.1.2 • M03.B-O.2.2.1 • M03.B-O.3.1.1 • M03.B-O.3.1.2 • M03.B-O.3.1.3 • M03.B-O.3.1.4 • M03.B-O.3.1.5 • M03.B-O.3.1.6 • M03.B-O.3.1.7
Geometry	**Reason with shapes and attributes:** ***M03.C-G.1.1 Analyze characteristics of polygons.*** • Understand shapes in different categories may have similar qualities. (different quadrilaterals have four sides but different specific qualities) Be able to draw figures. • Recognize rhombi, rectangles, and squares as examples of quadrilaterals and/or draw examples of quadrilaterals that do not belong to any of these subcategories. • Partition shapes into parts with equal areas. Express the area of each part of a unit fraction of the whole.	• M03.C-G.1.1.1 • M03.C-G.1.1.2 • M03.C-G.2.1.3

Measurement and Data	**Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses, and lengths of objects:** ***M03.D-M.1.1 Determine or calculate time and elapsed time.*** • Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems using addition and subtraction of minutes. • Calculate elapsed time to the minute in a given situation. ***M03.D-M.1.2 Use the attributes of liquid volume, mass, and length of objects.*** • Measure and estimate liquid volumes and masses of objects using standard units (cups [c], pints [pt], quarts [qt], gallons [gal], ounces [oz.], and pounds [lb]) and metric units (liters [l], grams [g], and kilograms [kg]). • Add, subtract, multiply, and divide to solve one-step word problems involving masses or liquid volumes that are given in the same units. • Use a ruler to measure lengths to the nearest quarter inch or centimeter. ***M03.D-M.1.3 Count, compare, and make change using a collection of coins and one-dollar bills.*** • Compare total values of combinations of coins (penny, nickel, dime, quarter) and/or dollar bills less than $5.00. • Make change for an amount up to $5.00 with no more than $2.00 change given (penny, nickel, dime, quarter, and dollar). • Round amounts of money to the nearest dollar. **Represent and interpret data:** ***M03.D-M.2.1 Organize, display, and answer questions based on data.*** • Draw a scaled picture graph and bar graph to represent data. • Solve one and two step problems "how many more" and "how many less" using the information from the graph. • Measure data by using rulers marked with wholes, halves, and fourths. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units: wholes, halves, and quarters. • Translate information from one type of display to another. Limit to pictographs, tally charts, bar graphs, and tables. **Geometric Measurement-Area (Relate to multiplication and addition):** ***M03.D-M.3.1 Find the areas of plane figures.*** • Measure area by counting units (square cm, m, in, ft, and improvised units.) • Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.	• M03.D-M.1.1.1 • M03.D-M.1.1.2 • M03.D-M.1.2.1 • M03.D-M.1.2.2 • M03.D-M.1.2.3 • M03.D-M.1.3.1 • M03.D-M.1.3.2 • M03.D-M.1.3.3 • M03.D-M.2.1.1 • M03.D-M.2.1.2 • M03.D-M.2.1.3 • M03.D-M.2.1.4 • M03.D-M.3.1.1 • M03.D-M.3.1.2

	Geometric Measurement-Perimeter (Attribute of plane figures and understand difference between linear and area measures.) ***M03.D-M.4.1 Find And use the perimeters of plane figures.*** • Solve real world problems and math problems involving perimeters of polygons with given side lengths, an unknown side length, and showing rectangles with same perimeter/different area or same area/different perimeter.	• M03.D-M.4.1.1