Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT #1

Program Name	WYCA	Content Area	Math
Course ID	CAEL78010	Grade Level	4
Course Name	Math 4 A	# of Credits	0.5
SCED Code	NoCourseSCED	Curriculum Type	Connections Academy

COURSE DESCRIPTION

In Math 4 A, the student will learn mathematical concepts related to place value, adding and subtracting multi-digit whole numbers, strategies for multiplication and division, factors, multiples, algebra, and patterns. Concepts are developed using mathematical processes of problem-solving, reasoning, communicating, representing, and making connections. Building both conceptual knowledge and procedural fluency supports the student's development of mathematical thinking and reasoning in solving various problems of authentic contexts.

In this course, the needs of the essential student are addressed in various ways, while still maintaining the integrity of the content. Special attention is paid to the reading level of the student-facing content to ensure comprehension. Each lesson includes a connection to prior knowledge and concrete examples to help your student relate to the new material. Hands-On Activities are included in every lesson and are customized for the essential learner. Practice, reinforcement, and error correction are encouraged throughout the course as your student works with small sets of problems at a time. Taken as a whole, these modifications give your student access to all grade-level content in a way that is conducive to your student's learning style.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK
MP1	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.
MP2	Mathematically proficient students make sense of the quantities and their relationships in problem situations. Students bring two 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.
MP3	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 data, making plausible arguments that take into account the context from which the data 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.

MP4	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 use 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.
MP5	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.
MP6	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 the 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.
MP7	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. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x^2 + 9x + 14, older students can see the 14 as 2 × 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.
MP8	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^2 + x + 1), and (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.
4.OA.1	Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
4.OA.2	Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
4.OA.3	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
4.OA.4	Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.
4.OA.5	Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.
4.NBT.1	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division. (Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.)

4.NBT.2	Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. (Grade 4 expectations in this
4.NBT.3	Use place value understanding to round multi-digit whole numbers to any place. (Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.)
4.NBT.4	Fluently add and subtract multi-digit whole numbers using the standard algorithm. (Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000. A range of algorithms may be used.)
4.NBT.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. (Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000. A range of algorithms may be used.)
4.NBT.6	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. (Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000. A range of algorithms may be used.)
4.NF.1	Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)
4.NF.2	Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)
4.NF.3	Understand a fraction a/b with a > 1 as a sum of fractions 1/b. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)
4.NF.3a	Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
4.NF.3b	Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.
4.NF.3c	Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
4.NF.3d	Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.
4.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)
4.NF.4a	Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).
4.NF.4b	Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)
4.NF.4c	Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?
4.NF.5	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100 and add 3/10 + 4/100 = 34/100. (Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.) (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)
4.NF.6	Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100 ; describe a length as 0.62 meters; locate 0.62 on a number line diagram. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)
4.NF.7	Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons comparisons are valid only when two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)
4.MD.1	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example: Know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ….
4.MD.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

4.MD.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.
4.MD.4	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.
4.MD.5	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.
4.MD.6	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
4.MD.7	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.
4.G.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
4.G.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
4.G.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES
Unit 1: Welcome to Math 4 This unit will introduce your student to the Math 4 course. In this unit, he will meet Clara, an animated character who will guide him through the course. Clara will pose math problems, work with your student to solve the problems, and provide tips and tricks. Your student will also become familiar with the instructional routines presented throughout the course, so that he is ready to begin learning with the first lesson.		• Introduce your student to the avatar companion, who will serve as an instructional helper throughout the course • Provide information about the types of lesson slides your student will encounter and what to expect to find on each • Introduce your student to the different types of assessments that appear throughout the course • Familiarize your student with the various icons used throughout the course and what types of assets they precede
Unit 2: Generalize Place Value Understanding In this unit, your student will extend her understanding of place value for multi-digit whole numbers. Your student will learn to represent whole numbers up to 1,000,000 using place-value relationships. Building upon this understanding of place-value relationships, students will compare and round multi-digit whole numbers. This unit will focus on the mathematical practice standard of "construct arguments."	MP-1., MP-4., MP-7., NBT.4.1., NBT.4.2., NBT.4.3.	• Read and write numbers in standard form, word form, and expanded form • Recognize the relationship between adjacent digits in a multi-digit number • Use place value to compare multi-digit numbers • Use place value to round multi-digit numbers • Use previously learned concepts and skills to construct arguments about place value
Unit 3: Fluently Add and Subtract Multi-Digit Numbers In this unit, your student will apply his knowledge and skills of basic addition and subtraction facts to solve addition and subtraction problems involving whole numbers of greater value. As your student learns to estimate and compute sums of numbers less than 100,000, he will use his background knowledge of place value to model the process of adding and subtracting numbers in the thousands period, with and without regrouping. Several properties of addition and the breaking-apart strategy are introduced to further develop your student's addition strategies. This unit will focus on the mathematical practice standard of "reasoning."	MP-1., MP-2., MP-4., MP-6., MP-7., OA.4.3., NBT.4.1., NBT.4.3., NBT.4.4.	• Add and subtract whole numbers mentally using a variety of methods • Round greater whole numbers to estimate sums and differences • Add numbers to one million with and without regrouping using the standard algorithm • Use place value and an algorithm to subtract whole numbers • Use number sense and regrouping to subtract across zeroes

Unit 4: Multiply by 1-Digit Numbers In this unit, your student's knowledge of basic facts and number patterns will support her as she learns to multiply single-digit numbers by multiples of 10 and 100. Your student will use strategies, such as compatible numbers and rounding, to estimate products. This unit will also engage your student in 3-digit by 1-digit and 4-digit by 1-digit multiplication problems. Arrays, place value, partial products, and the standard algorithm are some strategies that your student will employ to solve these multiplication problems. This unit will focus on the mathematical practice standard of "model with math."	MP-1., MP-4., MP-6., MP-7., OA.4.1., OA.4.2., OA.4.3., NBT.4.1., NBT.4.3., NBT.4.5.	• Multiply multiples of 10, 100, and 1,000 using mental math and place-value strategies • Use rounding to estimate products and check if answers are reasonable • Use the distributive property to multiply larger numbers • Use place value and properties of operations to multiply mentally • Use arrays, place value, partial products, and the standard algorithm to multiply 2-, 3-, and 4-digit numbers by 1-digit numbers
Unit 5: Multiply by 2-Digit Numbers In this unit, your student will multiply with multiples of 10 and 100, round factors, and use compatible numbers to estimate products. Your student will use several strategies including arrays, tables, the standard algorithm, and the expanded algorithm to solve 2-digit by 2-digit multiplication problems. Your student will practice mental math skills by multiplying greater numbers. This unit will focus on the mathematical practice standard of "make sense and persevere."	MP-1., MP-4., MP-6., MP-7., OA.4.2., OA.4.3., NBT.4.1., NBT.4.3., NBT.4.4., NBT.4.5.	• Use various strategies to multiply 2-digit numbers by multiples of ten • Estimate the product of two 2-digit numbers by rounding the factors to multiples of ten or using compatible numbers • Use arrays, place value, partial products, properties of operations, the Distributive Property, or an area model to multiply two 2-digit numbers • Use place value, partial products, the expanded algorithm, and the standard algorithm to calculate the product of two 2-digit numbers • Make sense of problems and persevere in solving them
Unit 6: Divide by 1-Digit Numbers In this unit, your student will estimate quotients and divide 3- and 4-digit dividends by single-digit divisors. Your student will encounter remainders in some of the division problems presented in this unit. She will use arrays and counters to visualize remainders. Your student's knowledge of place value, related multiplication and division facts, and estimation will allow her to understand and use a standard algorithm when dividing with larger numbers. This unit will focus on the mathematical practice standard of model with math.	MP-1., MP-4., MP-6., MP-7., OA.4.2., OA.4.3., NBT.4.1., NBT.4.3., NBT.4.6.	• Use mental-math and place-value strategies to divide multiples of 10 and 100 by 1-digit divisors • Use compatible numbers, place-value patterns, and division facts to estimate quotients • Solve division problems and interpret remainders • Use place value, drawings, partial quotients, and place-value understandings to divide • Divide using the standard division algorithm
Unit 7: Solve Problems with Whole Numbers In this unit, your student will use the skills developed involving multi-digit whole number addition, subtraction, multiplication, and division to solve word problems. As he solves word problems, he will draw on previously learned meanings of the four operations. He will also come to understand a new meaning of multiplication as comparison. This unit will focus on the mathematical practice standard of "make sense and persevere."	MP-1., MP-4., MP-6., MP-7., OA.4.2., OA.4.3., NBT.4.2., NBT.4.4., NBT.4.5.	• Interpret comparisons as multiplication or addition equations • Use multiplication and division to compare quantities • Solve two-step and multi-step problems by finding and solving the hidden question first • Make sense of a multi-step problem and keep working until it is solved
Unit 8: Factors and Multiples In this unit, your student will build on her understanding of multiplication to understand the meaning of factors and multiples. Your student will learn how to factor a whole number. She will find that prime numbers have only two factors, while composite numbers have more than two factors. This unit will focus on the mathematical practice standard of "repeated reasoning."	MP-1., MP-5., MP-7., MP-8., OA.4.4., NBT.4.5.	• Use arrays to find the factors of a given whole number • Use multiplication to find all the factor pairs for a whole number • Use repeated reasoning to generalize how to solve problems that are similar • Use factors to determine whether a whole number greater than 1 is prime or composite • Use multiplication to find multiples of a given number

Unit 9: Algebra: Generate and Analyze Patterns In this unit, your student will create and extend number sequences using a rule. He will generate a shape pattern based on a certain rule and predict a shape in the pattern. This unit will focus on the mathematical practice standard of “look for and use structure.”	MP-1., MP-7., MP-8., OA.4.5.	• Use a rule to create and extend number sequences • Identify features of a pattern • Generate a shape pattern and predict a shape in a pattern using a rule • Solve patterns using patterns