Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT #1

Program Name	WYCA	Content Area	Mathematics
Course ID	CAMA79295	Grade Level	9, 10, 11, 12
Course Name	Honors Algebra 1 A	# of Credits	0.5
SCED Code	02052H0.5012	Curriculum Type	Connections Academy

COURSE DESCRIPTION

This course is the first of two that comprise Honors Algebra 1. In this course, the student will be exposed to higher-level MA. The student will begin by reviewing basic real number operations and properties before learning how to translate between verbal descriptions of real-life situations and data presented in tables, graphs, and equations. Next the student will solve multi-step equations and inequalities. The student will write and graph linear equations in various forms. OT topics in the course include sequences and series, absolute value, rate of change, and set notation. By the end of the course, the student will solve linear systems of equations and inequalities. Throughout the course, the student will solve real-world problems and model real-world scenarios. Throughout the course, the student will be introduced to multiple problem-solving strategies and will be exposed to various technologies that can be utilized when solving algebra problems.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK
N.RN.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define 5^(1/3) to be the cube root of 5 because we want [5^(1/3)]^3 = 5^[(1/3) x 3] to hold, so [5^(1/3)]^3 must equal 5.
N.RN.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N.RN.3	Explain why the sum or product of rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
N.Q.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
N.Q.2	Define appropriate quantities for the purpose of descriptive modeling.
N.Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
A.SSE.1	Interpret expressions that represent a quantity in terms of its context.
A.SSE.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
A.SSE.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r)^n as the product of P and a factor not depending on P.
A.SSE.2	Use the structure of an expression to identify ways to rewrite it. For example, see x^4 – y^4 as (x^2)^2 – (y^2)^2, thus recognizing it as a difference of squares that can be factored as (x^2 – y^2)(x^2 + y^2).
A.SSE.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
A.SSE.3a	Factor a quadratic expression to reveal the zeros of the function it defines.
A.SSE.3b	Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
A.SSE.3c	Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15^t can be rewritten as [1.15^(1/12)]^(12t) ≈ 1.012^(12t) to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.
A.APR.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
A.APR.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
A.APR.4	Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity (x^2 + y^2)^2 = (x^2 – y^2)^2 + (2xy)^2 can be used to generate Pythagorean triples.
A.APR.6	Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.
A.APR.7	(+)Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
A.CED.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*
A.CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A.CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
A.CED.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.
A.REI.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
A.REI.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

A.REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
A.REI.4	Solve quadratic equations in one variable.
A.REI.4a	Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x – p)^2 = q that has the same solutions. Derive the quadratic formula from this form.
A.REI.4b	Solve quadratic equations by inspection (e.g., for x^2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.
A.REI.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
A.REI.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
A.REI.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line y = –3x and the circle x^2 + y^2 = 3.
A.REI.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
A.REI.11	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*
A.REI.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
F.IF.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
F.IF.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
F.IF.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1 (n is greater than or equal to 1).
F.IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.
F.IF.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
F.IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
F.IF.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
F.IF.7b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
F.IF.7c	Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
F.IF.7d	(+)Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
F.IF.7e	Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
F.IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
F.IF.8a	Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
F.IF.8b	Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)^t, y = (0.97)^t, y = (1.01)^(12t), y = (1.2)^(t/10), and classify them as representing exponential growth and decay.
F.IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
F.BF.1	Write a function that describes a relationship between two quantities.
F.BF.1a	Determine an explicit expression, a recursive process, or steps for calculation from a context.
F.BF.1b	Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.
F.BF.1c	(+)Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.

F.BF.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
F.BF.3	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
F.BF.4	Find inverse functions.
F.BF.4a	Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. For example, f(x) =2(x^3) or f(x) = (x+1)/(x-1) for x ≠ 1 (x not equal to 1).
F.BF.4b	(+)Verify by composition that one function is the inverse of another.
F.BF.4c	(+)Read values of an inverse function from a graph or a table, given that the function has an inverse.
F.LE.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.
F.LE.1a	Prove that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.
F.LE.1b	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
F.LE.1c	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
F.LE.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
F.LE.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
F.LE.5	Interpret the parameters in a linear or exponential function in terms of a context.
G.CO.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
G.GPE.5	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
S.ID.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
S.ID.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
S.ID.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
S.ID.5	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
S.ID.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
S.ID.6a	Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
S.ID.6b	Informally assess the fit of a function by plotting and analyzing residuals.
S.ID.6c	Fit a linear function for a scatter plot that suggests a linear association.
S.ID.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
S.ID.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.
S.ID.9	Distinguish between correlation and causation.
S.IC.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
S.IC.2	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0. 5. Would a result of 5 tails in a row cause you to question the model?
S.IC.4	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
S.IC.6	Evaluate reports based on data.

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES
Unit 1: Ready, Set, Succeed In this unit, you will focus on new ways to think about and approach mathematics. You will learn how to set SMART goals, establish study strategies that reduce math anxiety, and review ways to be an active learner. In addition, this unit introduces the various resources that are available to you in this course.		• Use strategies such as self-assessment and reflection in order to improve mathematical performance • Distinguish between effort-based and ability-based models of learning • Assess personal readiness for study and learning • Use resources to assist with goal-setting and attainment

Unit 2: Foundational Concepts In this unit, you will be provided with a general introduction to this course by reviewing many concepts from previous math courses including variables, expressions, and real-number operations. This unit provides you with a solid foundation for the remainder of this course. You will complete a unit portfolio project in which you will apply your knowledge of using variables to represent unknown and variable quantities, and writing expressions and equations.		• Write and simplify expressions • Graph, order, and compare real numbers on a number line • Use properties of real numbers to simplify expressions • Add, subtract, multiply, and divide real numbers
Unit 3: Solving Equations In this unit, you will learn how to solve problems using a variety of problem-solving strategies including tables, graphs, and equations. This unit also includes instruction on solving one, two, or multi-step equations, a skill that is essential to your learning of higher-level mathematics. You will complete a variety of assessments in this unit, including Quick Checks, quizzes, and a unit test.	N.Q.1, A.CED.1, A.CED.2, A.CED.4, A.REI.1, A.REI.3, A.REI.10	• Use tables and graphs to solve a problem •Solve equations with one, two, or multiple steps •Solve equations with variables on both sides •Solve equations and formulas for a given variable, using them in real-world scenarios
Unit 4: Solving Inequalities In this unit, you will learn how to solve inequalities that require one or more steps. You will also learn how to graph the solutions to inequalities on the number line. Set notation will be introduced as a tool for expressing the solutions to inequalities. Finally, you will explore absolute value equations and inequalities and the union and intersection of sets.	A.CED.1, A.REI.3	• Solve inequalities with one, two, or multiple steps • Graph the solutions to inequalities on the number line • Use set notation to express the solutions to inequalities • Solve and graph absolute value equations and inequalities
Unit 5: Introduction to Functions In this unit, you will explore functions and their applications. You will be introduced to the characteristics of a function and learn to compare linear and nonlinear functions. You will also graph functions on the coordinate plane and write functions given their graph. Functions are an important part of algebra because they lay a foundation for understanding higher-level mathematics problems that depend on your understanding of the characteristics of functions.	A.CED.2, A.REI.10, F.IF.1, F.IF.2, F.IF.3, F.IF.5, F.IF.7, F.BF.1, F.BF.1a, F.BF.1b, F.BF.1c, F.BF.2, F.LE.2	• Write, graph, and identify the solutions to inequalities • Represent mathematical relationships using graphs • Identify linear and nonlinear functions • Graph functions on the coordinate plane • Write equations to represent a function
Unit 6: Linear Functions In this unit, you will learn how to use several types of linear equations, including slope-intercept, point-slope, and standard forms. You will use slope to compare parallel and perpendicular lines and explore relationships between these types of lines. You will analyze scatter plots and fit regression lines to the data points. You will also graph and translate absolute value functions on the coordinate plane.	A.CED.1, F.IF.6, F.IF.7, F.IF.7a, F.BF.1, F.BF.3, F.LE.1b, F.LE.5, G.CO.1, G.GPE.5, S.ID.6, S.ID.6a, S.ID.6b, S.ID.6c, S.ID.7, S.ID.8, S.ID.9, S.IC.2, S.IC.4, S.IC.6,	• Write linear equations in standard form, point-slope form, and slope-intercept form • Find slope and x- and y-intercepts • Write equations of parallel and perpendicular lines • Write equations to represent direct variation • Graph linear equations, equations of direct variations, absolute value functions, and horizontal and vertical translations
Unit 7: Systems of Equations and Inequalities In this unit, you will apply what you know about linear equations and inequalities to systems of linear equations or inequalities. You will solve systems of linear equations by graphing, substitution, or elimination. You will also be introduced to the topic of matrices and use them to solve systems of equations. You will graph linear inequalities and solve systems of two linear equalities. Finally, you will apply these topics to solve real-world scenarios.	N.Q.1, N.Q.2, A.CED.3, A.REI.5, A.REI.6, A.REI.11, A.REI.12	• Solve systems of linear equations by graphing • Solve systems of linear equations by elimination • Solve systems of linear equations by substitution • Determine which method to use when solving a system of linear equations • Use an augmented matrix to solve a system of linear equations
Unit 8: Semester A Review and Exam In this unit, you will have the opportunity to prepare for and take the semester exam. Since this is a comprehensive exam, it may be helpful to organize your notes in the order of the course outline before you begin to review. Using the test-taking strategies that you have previously learned can help you be successful with both objective and essay questions.		• Decide which strategies you will use to prepare for your exam • Organize your time and study materials • Review your notes, keywords and vocabulary terms, and all important concepts that may be covered on this exam • Review your notes, keywords, formulas, and all important concepts that may be covered on this exam