Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT #1

Program Name	WYCA	Content Area	Mathematics
Course ID	CAMA79315	Grade Level	9, 10, 11, 12
Course Name	Honors Algebra 1 B	# of Credits	0.5
SCED Code	02052H0.5022	Curriculum Type	Connections Academy

COURSE DESCRIPTION

This course is the second of two that comprise Honors Algebra 1. In this course, the student will explore additional concepts in higher-level MA. The student will review the properties of exponents before learning how to add, subtract, multiply, divide, and factor polynomials. Next the student will learn how to write, solve, and graph quadratic and radical functions. OT topics in the course include simplifying scientific notation, simplifying radicals, trigonometric equations, and rational expressions. The end of the course concludes with a data analysis and probability unit, where the student will organize data using matrices, interpret histograms, calculate and interpret the measures of central tendency, find probability, and find permutations and combinations. 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: Mid-Year Refresher In this unit, you will review the major concepts from the first half of this algebra course that are applicable to the second half of this algebra course. These include working with integers, order of operations, solving linear equations, working with linear functions, and graphing on a coordinate plane.		•Add and subtract integers •Use the Order of Operations to simplify an expression •Solve one-step, two-step, and multi-step equations •Graph linear functions •Solve systems of equations by graphing, substitution, and elimination

Unit 2: Exponents and Exponential Functions In this unit, you will learn about expressions involving exponents in several forms. You will learn about zero and negative exponents and use what you know about exponents to solve problems using standard and scientific notation. You will learn and apply the rules for multiplication and division of expressions involving exponents. Finally, you will evaluate exponential functions and use exponential functions to solve real world problems of exponential growth and decay.	A.SSE.1b, A.SSE.2, A.SSE.3c, F.IF.7e, F.IF.8, F.IF.8b, F.IF.8b, F.LE.1b, F.LE.1c, F.LE.2, F.LE.3, F.LE.5	• Write numbers in scientific notation • Define and use zero and negative exponents • Apply rules for multiplying powers • Apply the rules for dividing powers • Use exponential functions to show growth or decay
Unit 3: Polynomials and Factoring In this unit, you will learn how to classify, add, and subtract polynomials. You will also learn to multiply polynomials and monomials, and how to factor polynomials using GCF. You will then find the squares of a binomial, the sum and difference of squares, and the product of a sum and difference	A.SSE.2, A.SSE.3, A.APR.1, A.APR.C.4	• Classify, add, and subtract polynomials • Multiply a monomial by a polynomial • Factor a monomial from a polynomial • Multiply two binomials or a binomial by a trinomial • Find a square of a binomial
Unit 4: Quadratic Functions and Equations In this unit, you will learn how to work with quadratic functions and quadratic equations. You will learn to graph functions in several forms and solve both quadratic equations and quadratic functions. You will also learn to choose between different models to display data, and finally, you will solve systems of linear and quadratic equations. These topics will be important foundational skills for your study of higher level mathematics.	A.SSE.2, A.SSE.3, A.SSE.3a, A.SSE.3b, A.APR.3, A.REI.4, A.REI.4a, A.REI.4b, A.REI.7, F.IF.7, F.IF.7a, F.IF.7c, F.IF.8, F.IF.8a, F.IF.9, F.LE.1, F.LE.1a, F.LE.1c	• Graph quadratic functions of the form $y = ax^2$ and $y = ax^2 + c$ • Graph functions of the form $y = ax^2 + bx + c$ • Solve quadratic equations by graphing and using square roots and by factoring • Solve quadratic equations by completing the square and by using the quadratic formula • Choose a linear, quadratic, or exponential model for data and solve systems of linear and quadratic equations
Unit 5: Radical Expressions and Data Analysis In this unit, you will work with radical expressions and learn various ways to analyze data. First, you will learn to simplify radicals and perform operations on radical expressions. You will learn to analyze square root functions by graphing them. Finally, you will learn to analyze data both graphically and numerically through the use of histograms, box-and-whisker plots, and measures of central tendency and dispersion.	N.RN.1, N.RN.2, N.Q.3, A.CED.4, A.REI.2, F.IF.7, F.IF.7b, F.BF.3, S.ID.1, S.ID.2, S.ID.3, S.ID.5, S.IC.1, S.IC.6	• Simplify radicals involving products and quotients • Simplify sums and differences of radical expressions • Simplify products and quotients of radical expressions • Find the mean, median, mode, and range of a data set • Make and interpret box-and-whisker plots
Unit 6: Rational Expressions and Functions In this unit you will work with rational expressions and equations. To begin, you will learn to simplify rational expressions. Then, you will learn to multiply and divide rational expressions and polynomials. You will also learn to simplify complex fractions. Finally, you will learn to define inverse variations and compare direct and inverse variations.	A.APR.6, A.APR.7, A.CED.2, A.REI.2, F.IF.4, F.IF.7, F.BF.4, F.BF.4a, F.BF.4c	• Simplify rational expressions • Multiply and divide rational expressions • Simplify complex fractions • Divide polynomials • Add and subtract rational expressions
Unit 7: Semester B Exam and Review This unit reviews concepts from Semester B of this algebra course. The unit begins with a review assignment that will help you recall topics from Units 1–6. You will also spend time utilizing the one-page review guides created at the end of each unit. These review guides contain key vocabulary, points to remember, and sample problems that you can rework. Practice opportunities from the textbook are included. The assessment is included at the conclusion of the unit in the form of the semester exam.		•Students demonstrate their knowledge of the concepts covered in this course