Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT #1

Program Name	WYCA	Content Area	Mathematics
Course ID	CAMA79480	Grade Level	9, 10, 11, 12
Course Name	Algebra 2 A, Part 2	# of Credits	0.5
SCED Code	02056G0.5022	Curriculum Type	Connections Academy

COURSE DESCRIPTION

In this second semester of Algebra 2 A, the student will review and expand on learning from the previous semester. This course will move at a slower pace than other Algebra 2 courses, and there will be a greater emphasis placed on instructional support. The units of this semester will focus on types of functions. The student will continue to study quadratic and radical functions, but will expand this to include exponential and logarithmic functions. The student will write, solve, and graph these functions.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK
N.CN.1	Know there is a complex number i such that i2 = –1, and every complex number has the form a + bi with a and b real.
N.CN.2	Use the relation i2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
N.CN.3	Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.
N.CN.4	Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.
N.CN.5	Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation.
N.CN.6	Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.
N.CN.7	Solve quadratic equations with real coefficients that have complex solutions.
N.CN.8	Extend polynomial identities to the complex numbers.
N.CN.9	Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
N.VM.6	Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
N.VM.8	Add, subtract, and multiply matrices of appropriate dimensions.
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.
A.SSE.2	Use the structure of an expression to identify ways to rewrite it.
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.
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.2	Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).
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.C.4	Prove polynomial identities and use them to describe numerical relationships.
A.APR.5	Know and apply the Binomial Theorem for the expansion of (x + y)n in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.
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 nonviable options in a modeling context.
A.CED.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

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.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 x2 = 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.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 x2 + y2 = 3.
A.REI.8	Represent a system of linear equations as a single matrix equation in a vector variable.
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,
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.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
F.IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
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.7c	Graph polynomial functions, identifying zeros 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.
F.IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
F.BF.1	Write a function that describes a relationship between two quantities:
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
F.BF.4	Find inverse functions:
F.BF.5	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.

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
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.4	For exponential models, express as a logarithm the solution to abct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.
F.LE.5	Interpret the parameters in a linear or exponential function in terms of a context.
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).

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES
Unit 1: Polynomials and Polynomial Functions You previously explored a specific type of polynomial, a quadratic polynomial. In this unit, you will explore a variety of polynomials, including monomials, binomials, and trinomials. You will learn how to identify and describe the properties of polynomial equations based on the powers of the variable terms they contain. In addition, you will learn methods to identify and represent factors, zeroes, and x intercepts of polynomial functions. You will identify the features of polynomial functions and their graphs and use them to model real-world situations, such as maximizing the volume of a box and representing energy with power functions. You will also be introduced to methods and theorems that you will apply to solve polynomial equations.	N.CN.7, N.CN.8, N.CN.9, A.SSE.1, A.SSE.1a, A.SSE.1b, A.SSE.2, A.APR.1, A.APR.2, A.APR.3, A.APR.C.4, A.APR.5, F.IF.4, F.IF.7, F.IF.7c, F.IF.8, F.BF.3	•Identify the number of zeroes and degree of a polynomial equation •Find zeroes of a polynomial equation by factoring or graphing and finding x-intercepts •Write and use polynomial functions to solve problems
Unit 2: Radical Functions and Rational Exponents In this unit, you will continue to explore functions, specifically radical functions. Operations such as addition, subtraction, multiplication, and division are performed with radical expressions, which you will learn in addition to how to simplify radical expressions. You will learn that radical functions can be written using a symbol or by using exponents that are fractions. You will also explore the graphs of radical functions and their inverses. Finally, you will continue modeling real-world applications using radical functions, such as calculating voltage or circular velocity.		•Simplify radical expressions and solve radical equations •Determine the domain of radical functions and find extraneous solutions •Find and graph inverse functions
Unit 3: Exponential and Logarithmic Functions In this unit, you will explore two more types of functions, exponential and logarithmic. You will use exponential functions to model real-world situations and solve real-world problems, including problems involving interest and population growth or decay. You will also learn how using logarithms can help you solve exponential equations. Finally, you will learn to graph both exponential and logarithmic functions.	A.SSE.1, A.SSE.3, A.SSE.3c, A.CED.2, A.REI.11, F.IF.7, F.IF.7e, F.IF.8, F.IF.8a, F.IF.8b, F.BF.1, F.BF.4, F.BF.5, F.LE.1, F.LE.1a, F.LE.1c, F.LE.2, F.LE.3, F.LE.4, F.LE.5	•Model situations using exponential functions •Solve logarithmic equations using exponents •Solve exponential equations using logarithms •Graph exponential and logarithmic functions

Unit 4: Semester A Review and Exam In this unit, you will review concepts from Semester A in order to prepare for the semester exam, which you will take at the end of this unit.		•Students demonstrate their knowledge of the concepts covered in this course