Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT #1

Program Name	WYCA	Content Area	Mathematics
Course ID	CAMA79489	Grade Level	9, 10, 11, 12
Course Name	Algebra 2 B, Part 1	# of Credits	0.5
SCED Code	02056G0.5012	Curriculum Type	Connections Academy

COURSE DESCRIPTION

In this first semester of Algebra 2 B, the student will strengthen algebraic problem-solving abilities and develop a deeper understanding of mathematics. 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 first unit is a review of prerequisite knowledge. The student will, among other things, explore operations, graphs, and real-world applications related to rational functions, observe different types of geometric and arithmetic patterns, explore the properties of quadratic functions, and examine graphs and equations of conic sections.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK
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.4	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems.
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.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.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.
F.IF.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
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.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.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.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.4d	Produce an invertible function from a non-invertible function by restricting the domain.

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.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.TF.1	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
F.TF.2	Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
F.TF.3	Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosines, and tangent for x, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number.
F.TF.4	Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
F.TF.5	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
F.TF.6	Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
F.TF.7	Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.
F.TF.8	Prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.
F.TF.9	Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.
G.SRT.7	Explain and use the relationship between the sine and cosine of complementary angles.
G.C.5	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
G.GPE.1	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
G.GPE.2	Derive the equation of a parabola given a focus and directrix.
G.GPE.3	Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.
G.GMD.4	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
G.MG.1	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
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.4	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
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.
S.IC.3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
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.B5	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

S.IC.6	Evaluate reports based on data.
S.CP.1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).
S.CP.2	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
S.CP.3	Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.
S.CP.4	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.
S.CP.5	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
S.CP.6	Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A, and interpret the answer in terms of the model.
S.CP.7	Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.
S.CP.8	Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.
S.CP.9	Use permutations and combinations to compute probabilities of compound events and solve problems.
S.MD.1	Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.
S.MD.2	Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.
S.MD.3	Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.
S.MD.4	Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.
S.MD.5	Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values:
S.MD.5a	Find the expected payoff for a game of chance.
S.MD.5b	Evaluate and compare strategies on the basis of expected values.
S.MD.6	Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
S.MD.7	Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES
Unit 1: Review of Algebra 2 A In this unit, you will review the major concepts from Algebra 2 A that are applicable to Algebra 2 B. These include working with linear systems of equations, quadratic functions, exponential and logarithmic functions, as well as polynomials and polynomial functions.		•Review expressions, equations, and inequalities •Review linear systems •Review quadratic functions and equations •Review polynomials and polynomial functions •Review exponential and logarithmic functions
Unit 2: Rational Functions In this unit, you will be exploring rational functions beginning with inverse and direct variations. Next, you will have the opportunity to stretch, compress, reflect, and translate functions while exploring reciprocal functions. Finally, you will be adding and subtracting rational expressions, and then solving rational equations. These concepts will be used to solve real situations that involve two different rates, such as calculating speed while taking into account the wind.	A.SSE.1, A.SSE.1b, A.SSE.2, A.APR.6, A.APR.7, A.CED.1, A.REI.11, F.IF.7d, F.BF.1, F.BF.3	• Write and graph functions to solve problems • Write and interpret rational expressions to solve problems • Apply skills in a variety of contexts on the unit test

Unit 3: Sequences and Series In this unit, you will explore different types of patterns in arithmetic and geometric sequences. You will identify mathematical patterns and create a rule to describe a pattern. Finally, you will find the sum of an arithmetic or geometric series, or use the sum of a series to determine the number of terms.	A.SSE.1, A.SSE.1a, A.SSE.4, F.IF.3, F.BF.1, F.BF.1a, F.BF.2, F.LE.2	•Identify mathematical patterns found in a sequence •Identify mathematical sequences and series as arithmetic or geometric •Apply a formula to find the nth term of an arithmetic or geometric sequence •Write and apply recursive and expressive rules for arithmetic and geometric sequences •Apply a formula to find the sum of an arithmetic or geometric series
Unit 4: Quadratic Relations and Conic Sections Different types of curves are formed when a plane and a cone intersect, depending on the angle of intersection. In this unit, you will explore these different types of conic sections, referred to as parabolas, circles, ellipses, and hyperbolas. You will learn about their graphs and equations, and how to use these conic sections to model and solve problems.	A.CED.1, A.REI.10, G.GPE.1, G.GPE.2, G.GPE.3, G.GMD.4, G.MG.1	•Identify conic sections •Write the equation of a circle, a parabola, an ellipse, and a hyperbola •Graph a circle, a parabola, an ellipse, and a hyperbola •Model and solve problems using conic sections
Unit 5: Algebra 2 B, Part 1 Semester Test Chances of winning a lottery, batting averages, and surveys are a few of the many places where probability and statistics appear in real-world situations. In this unit, you will explore ideas concerning the number of ways events can occur using permutations and combinations. You'll learn which sampling methods reduce bias and provide good statistical information.	A.APR.5, S.ID.1, S.ID.2, S.ID.3, S.ID.4, S.IC.1, S.IC.2, S.IC.3, S.IC.4, S.IC.B5, S.IC.6, S.CP.1, S.CP.2, S.CP.3, S.CP.4, S.CP.5, S.CP.6, S.CP.7, S.CP.8, S.CP.9, S.MD.1, S.MD.2, S.MD.3, S.MD.4, S.MD.5, S.MD.5a, S.MD.5b, S.MD.6, S.MD.7	•Review for the semester exam •Identify areas of strength and weakness in the material •Complete a practice assessment and analyze your results