Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT #1

Program Name	WYCA	Content Area	Mathematics
Course ID	CAMA86312	Grade Level	8
Course Name	Middle School Math 8 B	# of Credits	0.5
SCED Code	02038G0.5022	Curriculum Type	Connections Academy

COURSE DESCRIPTION

Throughout this course, the student will engage in group and individual learning activities using a consumable textbook and intelligent, adaptive software as the basis for content. The student will use lines of best fit to analyze patterns in bivariate data and draw conclusions. The student will learn to write equations to represent real-world scenarios and use inverse operations to solve the equations. The student will explore multiple methods of solving a system of equations and learn how to select the best method of solving each system. The student will learn about the real number system and categorize all types of real numbers. The student will also use the Pythagorean Theorem, exponents, and scientific notation to solve problems. Finally, the student will learn to find the volume of a curved figure, including cylinders, cones, and spheres.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK
8.NS.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0's or eventually repeat. Know that other numbers are call irrational.
8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π2). For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.
8.EE.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 3^2 × 3^(–5) = 3^(–3) = 1/(3^3) = 1/27.
8.EE.2	Use square root and cube root symbols to represent solutions to equations of the form x^2 = p and x^3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.
8.EE.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 × 10^8 and the population of the world as 7 × 10^9, and determine that the world population is more than 20 times larger.
8.EE.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
8.EE.7a	Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).
8.EE.7b	Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
8.EE.8	Analyze and solve pairs of simultaneous linear equations.
8.EE.8a	Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
8.G.6	Explain a proof of the Pythagorean Theorem and its converse.
8.G.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
8.G.9	Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
8.SP.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
8.SP.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.
8.SP.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OBJECTIVES

Unit 1: Patterns in Bivariate Data Students investigate associations in bivariate data, both quantitative and categorical. They construct scatter plots and determine if scatter plots exhibit linear relationships and describe other patterns of association, including clustering, outliers, or a positive or negative association. Students informally fit lines of best fit, determine the equations of those lines, interpret the slopes and y-intercepts of the lines, and use the equations to make and judge the reasonableness of predictions about the data. Finally, students construct and interpret two-way frequency and relative frequency tables to describe possible associations between two categorical variables.	8.SP.1, 8.SP.2, 8.SP.3, 8.SP.4	• Construct and interpret scatter plots for bivariate measurement data • Use straight lines to model relationships between two quantitative variables with a linear association • Write the equation of a linear model of bivariate data and use the equation to solve problems and make predictions • Interpret the meaning of the slope and y-intercept of a linear model • Use relative frequencies to describe possible associations between two sets of data
Unit 2: Solving Linear Equations Students solve equations with rational coefficients and variables on both sides of the equals sign. They learn strategies to efficiently solve equations with rational number coefficients. Students write and solve equations to represent real-world situations. Students learn to recognize, algebraically, when equations have one solution, no solution, or infinite solutions. Then they use given expressions to form equations with specific solution sets.	8.EE.7.a, 8.EE.7.b	• Solve linear equations in one variable with rational coefficients and variables on both sides of the equals sign • Solve equations that require the use of the Distributive Property and by collecting like terms • Write and solve linear equations with one solution, no solution, or infinite solutions
Unit 3: Systems of Linear Equations Students analyze and solve pairs of simultaneous linear equations by graphing, through substitution, and by inspection of the coefficients of the equations in the systems. Students write systems of equations to represent problem situations, solve the systems, interpret the meaning of the solution in the context of the situation. They solve systems with no solutions and infinite solutions graphically and algebraically, making connections between the equations, graphs, and final solution. To build fluency with solving systems of linear equations, students write and solve additional systems, using the structure of the equations in the system to determine the most efficient solution strategy.	8.EE.8, 8.EE.8.a, 8.EE.8.b, 8.EE.8.c	• Solve a system of linear equations by substitution, inspection of the equations, or graphing • Identify or estimate the solution(s), or point(s) of intersection, in a graph of a system of linear equations • Use slope and y-intercept to determine whether two linear equations have one solution, no solution, or infinite solutions • Represent real-world and mathematical problems as systems of linear equations and interpret the solution in terms of the problem
Unit 4: The Real Number System Students build onto their knowledge of number systems to include the set of irrational numbers, specially square roots and cube roots of non-perfect squares and cubes. They review natural numbers, whole numbers, integers, and rational numbers and determine which systems have an additive identity, additive inverse, multiplicative identity, or multiplicative inverse and which are closed under the four basic arithmetic operations. They learn to convert rational numbers from repeating decimals to fractional form. Students then determine square roots and cube roots of perfect squares and perfect cubes and use rational approximations to estimate the value of irrational numbers, including solutions to equations.	8.NS.1, 8.NS.2, 8.EE.2	• Sort numbers according to their properties • Convert fractions to terminating or repeating decimals • Define rational and irrational numbers • Determine the approximate locations of irrational numbers on a number line • Order and compare rational and irrational numbers using a number lin
Unit 5: Pythagorean Theorom Students explore the Pythagorean Theorem and its converse. They investigate visual proofs of the Pythagorean Theorem and apply the theorem to determine lengths of unknown sides of right triangles. Students prove the Converse of the Pythagorean Theorem and use the theorem as they generate Pythagorean triples and solve real-world problems. They then use the Pythagorean Theorem to calculate distances between two points on the coordinate plane and in two- and three-dimensional geometric figures.	8.EE.2, 8.G.6, 8.G.7, 8.G.8	• Use the Pythagorean Theorem to determine unknown side lengths in right triangles in mathematical and real-world problems in two and three dimensions • Use the Converse of the Pythagorean Theorem to determine if a given triangle is a right triangle • Generate Pythagorean triples • Apply the Pythagorean Theorem to determine the distance between two points in a coordinate system and the lengths of diagonals in two- and three-dimensional figures
Unit 6: Exponents and Scienctific Notation Students learn and apply properties of integer exponents. They explore exponent rules with positive and negative bases, including products of powers, quotients of powers, and powers of powers, and develop rules for each operation. Then they determine rules for 0 and negative exponents. Students then explore scientific notation. They learn to express numbers in standard form in scientific notation and those in scientific notation in standard form. Students multiply, divide, add, and subtract numbers expressed in scientific notation, making connections to the exponent rules. Then they compare the relative sizes of and operate on numbers expressed in scientific notation and standard form.	8.EE.1, 8.EE.3, 8.EE.4	• Apply the properties of integer exponents • Explore exponent rules with positive and negative bases, including products of powers, quotients of powers, and powers of powers, and develop rules for each operation • Determine rules for zero and negative exponents • Express numbers in standard form into scientific notation and numbers in scientific notation into standard form • Multiply, divide, add, and subtract numbers expressed in scientific notation

Unit 7: Volume of Curved Figures Students derive formulas for the volumes of cylinders, cones, and spheres. They apply each formula to mathematical and real-world problems. In some cases, students must use the Pythagorean Theorem to determine needed measures. Finally, students compute the volumes of composite figures and compare the volumes of cones and spheres, of two cylinders, and of cones and cylinders as they solve problems.	8.G.9	State the formulas for the volumes of cones, cylinders, and spheres Solve real-world and mathematical problems involving the volumes of cones, cylinders and spheres Compare the volumes of cones, cylinders, and spheres Determine and apply appropriate volume formulas in order to solve real-world and mathematical problems