

Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT #1

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| Program Name | WYCA | Content Area | Math |
| Course ID | CAMA86314 | Grade Level | 8 |
| Course Name | Algebra Readiness (Pre-Algebra) A | # of Credits | 0.5 |
| SCED Code | 02051B0.5011 | Curriculum Type | Connections Academy |

COURSE DESCRIPTION

This is the first of two courses that comprise Algebra Readiness. In this course, the student will be introduced to basic algebraic principles. The student will review properties of expressions and integers. The student will solve one-step equations and inequalities with positive and negative integers, decimals, fractions, and exponents. Then the student will explore problems involving operations of fractions and will apply his knowledge of algebra to solve real-world ratio, proportion, and percent problems. Finally, the student will examine and evaluate two-step and multi-step equations and inequalities.

WYOMING CONTENT AND PERFORMANCE STANDARDS

| STANDARD# | BENCHMARK |
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| 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 called 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., π^2). For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ 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, $3^2 \times 3^4(-5) = 3^6(-5) = 1/(3^6) = 1/27$. |
| 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 $\sqrt{2}$ 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.5 | Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. |
| 8.EE.6 | Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b . |
| 8.EE.7 | Solve linear equations in one variable. |
| 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.EE.8b | Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6. |
| 8.EE.8c | Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair. |
| 8.F.1 | Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in Grade 8.) |
| 8.F.2 | Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change. |
| 8.F.3 | Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line. |
| 8.F.4 | Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the |

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| 8.F.5 | Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. |
| 8.G.1 | Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. |
| 8.G.2 | Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. |
| 8.G.3 | Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates. |
| 8.G.4 | Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. |
| 8.G.5 | Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so. |
| 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# | OUTCOMES |
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| <p>Unit 1: Focus on Success in Algebra Readiness</p> <p>In this unit, you will focus on ways to think about and approach mathematics. You will learn how to set personal goals, establish study strategies that reduce anxiety, and review ways to be an active learner. In addition, this unit introduces the various resources that are available to you in your algebra readiness course.</p> | | <ul style="list-style-type: none"> • Assess personal readiness for studying and learning • Recognize the importance of personal ownership of learning • Reflect on personal strengths and weaknesses in order to improve mathematical performance • Use resources to set goals |
| <p>Unit 2: Integers and Algebraic Expressions</p> <p>In this unit, you will review the foundational concepts necessary for algebra and mathematical reasoning including integer operations and use of variables to represent unknown quantities. Emphasis will be placed upon achieving mastery of integer operations and the skill of rewriting a subtraction expression as addition of an opposite integer.</p> | | <ul style="list-style-type: none"> • Apply the order of operations and number properties • Use appropriate operations to solve problems involving integers • Rewrite equations replacing subtraction with addition involving an integer |
| <p>Unit 3: Rational Numbers</p> <p>This unit will focus on the use of fractions and exponents. In this unit, you will order rational numbers, convert between decimals and fractions, and perform operations using fractions and mixed numbers. In addition, you will learn to use a formula and to evaluate a power. At the conclusion of this unit, you will complete a portfolio project using fractions to adjust portions for more or fewer people in a healthy recipe of your choosing.</p> | 8.NS.1, 8.EE.1, 8.EE.3, 8.EE.4 | <ul style="list-style-type: none"> • Perform operations using positive and negative rational numbers • Predict the size and sign of a product relative to its multiplicand and multiplier • Identify and use powers, including numbers in scientific notation |

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| <p>Unit 4: Real Numbers and the Coordinate Plane Previously in your studies, you worked with a set of numbers called the rationals. In this unit, you will begin to work with another set of numbers called the irrationals. By the end of this unit, you will be able to estimate the value of an irrational number by comparing it to one or two rational numbers. You will also use irrational numbers to approximate the length of lines by applying the Pythagorean Theorem. Finally, you will use a coordinate plane to create symmetrical figures.</p> | <p>8.NS.1, 8.NS.2, 8.EE.2, 8.G.1, 8.G.3, 8.G.6, 8.G.7, 8.G.8</p> | <ul style="list-style-type: none"> • Identify the differences between rational and irrational numbers and use rational numbers to estimate and order irrational numbers • Estimate the value of a square root • Use the Pythagorean Theorem to find the lengths of sides of a right triangle |
| <p>Unit 5: Applications of Proportions This unit will focus on ratios and proportions. You will use ratios to compare two things, and then use those ratios to solve proportions. There will be a portfolio project for this unit, using a real-world scenario. You will take detailed measurements of your bedroom and create a to-scale map using appropriate measurements.</p> | <p>8.G.3, 8.G.4</p> | <ul style="list-style-type: none"> • Identify and simplify ratios to solve proportions • Perform unit conversions and dilations • Use proportions in real-world applications, including scale models and indirect measurements |
| <p>Unit 6: Applications of Percents In this unit, you will learn that a percent is a ratio comparing a number to one hundred. You will then use percents to find and compare amounts of increase or decrease and to calculate new prices based on markup, discount, and sales tax. The portfolio project at the end of this unit will require you to find products online and calculate a new price based upon a percent discount and state sales tax.</p> | | <ul style="list-style-type: none"> • Determine a quantity as a percent of a whole, a total based upon the percent amount of a portion, and the percent of a portion based upon its total • Use percents to find an amount of increase or decrease |
| <p>Unit 7: Equations and Inequalities In this unit, you will use algebraic skills to solve for an unknown quantity in an equation or inequality. You will start with two-step equations and work your way through multiple-step equations to solving equations with variables on both sides of the equal sign.</p> | <p>8.EE.7, 8.EE.7a, 8.EE.7b, 8.EE.8c</p> | <ul style="list-style-type: none"> • Combine like terms in a mathematic expression • Balance equations and inequalities using inverse operations • Solve equations and inequalities for a variable |