Ganado Unified School District #20
(Algebra 1/9th Grade)

PACING Guide SY 2022-2023 **Therron Todacheenie on behalf of GHS Math Dept.**

Time Line & Resources (Identify textbook, page number or website link & etc.)	**AZ College and Career Readiness Standard**	**Essential Question (HESS Matrix)**	**Learning Goal**	**Vocabulary (Content/Academic)**
References: **McGraw Hill Reveal Algebra 2020** **ALEKS Online Learning** **Algebra 1 Coach** **Triumphant Learning Workbook -supplementary resources**	**Standards for Mathematical Practices** ***(These will be applied in all units of study.)*** 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.			

Module 1				
Module 1: Expressions **Lesson 1-1** **Numerical Expressions** **Lesson 1-2** **Algebraic Expressions** **Lesson 1-3** **Properties of Real Numbers** **Lesson 1-4** **Distributive Property** **Lesson 1-5** **Expressions Involving Absolute Value** **Lesson 1-6** **Descriptive Modeling and Accuracy**	**N.RN.3 –** Explain why sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that product of a nonzero rational number and an irrational number is irrational. **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.2** – Use the structure of an expression to identify ways to rewrite it.	How can mathematical expressions be represented and evaluated?	-write and evaluate numerical expressions. -write and evaluate algebraic expressions. -apply the properties of real numbers to simplify expressions. -simplify expressions by using the Distributive Property. -evaluate absolute value expressions. -use quantities for the purpose of descriptive modeling, and report solutions with an appropriate level of accuracy.	Absolute value Accuracy Additive identity Additive inverses Algebraic expression Base Closed Coefficient Constant term Define a variable Descriptive modeling Equivalent-expressions Evaluate Exponent Like terms Metric Multiplicative-identity Multiplicative-inverses Numerical expression Reciprocals Simplest form Term Variable Variable term
Module 2				
Module 2: Equations in One Variable **Lesson 2-1** **Writing and Interpreting Equations**	**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	How can writing and solving equations help you solve problems in the real world?	-create and interpret equations that describe relationships. -solve equations by using addition, subtraction, multiplication, and division.	Constraint Dimensional analysis Equation Equivalent equations Formula Identity

Lesson 2-2 **Solving One-Step Equations** **Lesson 2-3** **Solving Multi-Step Equations** **Lesson 2-4** **Solving Equations with the Variable on Each Side** **Lesson 2-5** **Solving Equations Involving Absolute Value** **Lesson 2-6** **Solving Proportions** **Lesson 2-7** **Using Formulas**	interpret the scale and the origin in graphs and data displays. **A.CED.1** – Create equations and inequalities in one variable and use them to solve problems. **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. **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.		-solve multi-step equations and equations for specific lettered coefficients by applying properties of equality. -solve equations with the variable on each side by applying the properties of equality and the Distributive Property. -solve absolute value equations. -solve equations involving proportions. -solve equations for specific variables and convert units of measure by applying the properties of equality.	Literal equation Multi-step equation Proportion Solution Solve an equation
Module 3				
Module 3: Relations and Functions **Lesson 3-1** **Representing Relations**	**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	Why are representations of relations an functions useful?	-represent relations with graphs, ordered pairs, tables, and mappings.	Continuous function Decreasing Dependent variable Discrete function Domain

Lesson 3-2 **Functions** **Lesson 3-3** **Linearity and Continuity of Graphs** **Lesson 3-4** **Intercepts of Graphs** **Lesson 3-5** **Shapes of Graphs** **Lesson 3-6** **Sketching Graphs and Comparing Functions**	interpret the scale and the origin in graphs and data displays. **A.REI.10** – Understand that the graph of an equation in two variables is the set of all its solutions plotted in coordinate plane, often forming a curve (which could be a line). **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 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 context **F.IF.4** – For 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.9** – Compare properties of two functions each represented in a		-determine whether a relation is a function and find function values. -identify linear and nonlinear functions and continuous and discrete functions. -identify intercepts of functions and solve equations by graphing. -identify symmetry, extrema, and end behavior of functions. -sketch graphs of functions and compare two or more functions.	End behavior Extrema Function Function notation Increasing Independent variable Line symmetry Linear equation Linear function Mapping Negative Nonlinear function Positive Range Relation Relative maximum Relative minimum Root Scale x-intercept y-intercept zero

	different way (algebraically, graphically, numerically in tables, or by verbal descriptions).			
Module 4				
Module 4: Linear and Nonlinear Functions **Lesson 4-1** **Graphing Linear Functions** **Lesson 4-2** **Rate of Change and Slope** **Lesson 4-3** **Slope-Intercept Form** **Lesson 4-4** **Transformations of Linear Functions** **Lesson 4-5** **Arithmetic Sequences** **Lesson 4-6** **Piecewise and Step Functions** **Lesson 4-7** **Absolute Value Functions**	**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.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.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.BF.1a** – Determine as 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*	What can a function tell you about the relationship that it represents?	-graph linear functions by using tables and intercepts. -find and interpret the rate of change and slopes of lines. -graph equations in slope-intercept form. -identify the effects of transformations of the graphs of linear functions. -write and graph equations of arithmetic sequences. -graph piecewise-defined and step functions. -identify the effects of transformations of the graphs of absolute value functions.	Absolute value function Arithmetic sequence Common difference Constant function Dilation Family of graphs Greatest integer function Identity function Interval n^{th} term of an arithmetic sequence Parameter Parent function Piecewise-defined function Piecewise-linear function Rate of change Reflection Sequence Slope Step function Term of a sequence Transformation Translation Vertex

	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. **F.LE.1a** – Prove that the linear functions to grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. **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.5** – Interpret the parameters in a linear or exponential function in terms of a context. **A.CED.2** – Create equations in two or more variables to represent relationships between quantities; graph equations or coordinate axes with labels and scales. **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).			
Module 5				

Module 5: Creating Linear Equations **Lesson 5-1** **Writing Equations in Slope-Intercept Form** **Lesson 5-2** **Writing Equations in Standard and Point-Slope Forms** **Lesson 5-3** **Scatter Plots and Lines of Fit** **Lesson 5-4** **Correlation and Causation** **Lesson 5-5** **Linear Regression** **Lesson 5-6** **Inverses of Linear Functions**	**A.CED.2** – Create equations in two or more variables to represent relationships between quantities; graphs 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. **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. **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.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.	What can a function tell you about the relationship that it represents?	-create linear equations in slope-intercept form. -create linear equations in point-slope form and standard form. -use scatter plots to make and evaluate predictions. -determine whether a situation illustrates correlation or causation. -use best-fit lines and correlation coefficients to determine how well linear functions fit sets of data. -find inverses of functions.	Best-fit line, Bivariate data Causation Correlation coefficient Inverse functions Inverse relations Line of fit Linear extrapolation Linear interpolation Linear regression Negative correlation No correlation Parallel lines Perpendicular lines Positive correlation Residual Scatter plot trend
Module 6				

Module 6: Linear Inequalities **Lesson 6-1** **Solving One-Step Inequalities** **Lesson 6-2** **Solving Multi-Step Inequalities** **Lesson 6-3** **Solving Compound Inequalities** **Lesson 6-4** **Solving Absolute Value Inequalities** **Lesson 6-5** **Graphing Inequalities in Two Variables**	**A.CED.1** – Create equations and inequalities in one variable and use them to solve problems. **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. **A.REI.3** – Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **A.REI.12** – Graph the solutions to a linear inequality in two variables as 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.	How can writing and solving inequalities help you solve problems in the real world?	- solve inequalities by using addition, subtraction, multiplication, and division. - solve inequalities by using more than one step. - write and solve combinations of two inequalities joined by "and" or "or." - solve absolute value inequalities. - graph linear inequalities on the coordinate plane.	Boundary Closed half-plane Compound inequality Half-plane Inequality Intersection Open half-plane Set-builder notation union
Module 7				
Module 7: Systems of Linear Equations and Inequalities **Lesson 7-1** **Graphing Systems of Equations** **Lesson 7-2** **Substitution** **Lesson 7-3** **Elimination Using Addition and Subtraction**	**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. **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.	How are systems of equations useful in the real world?	- solve systems of equations by graphing. - solve systems of equations by using substitution. - solve systems of equations by using elimination with addition or subtraction. - solve systems of equations by using elimination with multiplication. - solve systems of inequalities by graphing.	Consistent Dependent Elimination Inconsistent Independent Substitution System of equations System of inequalities

Lesson 7-4 **Elimination Using Multiplication** **Lesson 7-5** **Systems of Inequalities**	**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.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.			
Module 8				
Module 8: Exponents and Roots **Lesson 8-1** **Multiplication Properties of Exponents** **Lesson 8-2** **Division Properties of Exponents**	**A.SSE.2 -** Use the structure of an expression to identify ways to rewrite it. **A.SSE.3c -** Use the properties of exponents to transform expressions for exponential functions. **N.RN.1 -** Explain how the definition of the meaning of rational exponents follows from extending the	How do you perform operations and represent real-world situations with exponents?	- apply the multiplication properties of exponents to simplify expressions. - apply the division properties of exponents to simplify expressions. - apply the properties of zero and negative exponents to simplify expressions.	Cube root Exponential equation Index Monomial Negative exponent n^{th} root Perfect cube Perfect square Principal square root

Lesson 8-3 **Negative Exponents** **Lesson 8-4** **Ration Exponents** **Lesson 8-5** **Simplifying Radical Expressions** **Lesson 8-6** **Operations with Radical Expressions** **Lesson 8-7** **Exponential Equations**	properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. **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 two 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.		- apply the properties of rational exponents to simplify expressions. - simplify radical expressions. - perform operations with radical expressions. - solve exponential equations.	Radical expression Radicand Rational exponent Square root
Module 9				
Module 9: Exponential Functions **Lesson 9-1** **Exponential Functions** **Lesson 9-2** **Transformations of Exponential Functions** **Lesson 9-3** **Writing Exponential Functions** **Lesson 9-4** **Transforming Exponential Expressions** **Lesson 9-5** **Geometric Sequences**	**A.SSE.3c -** Use the properties of exponents to transform expressions for exponential functions. **F.IF.3 -** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. **F.IF.7e -** Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. **F.IF.8b -** Use the properties of exponents to interpret expressions for exponential functions. **F.BF.2 -** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model	When and how can exponential functions represent real-world situations?	- graph exponential functions. - identify the effects of transformations of the graphs of exponential functions. - create exponential functions and solve problems involving exponential growth and decay. - use the properties of exponents to transform expressions for exponential functions. - write and graph equations of geometric sequences. - write arithmetic and geometric sequences recursively.	Asymptote Common ratio Compound interest Explicit formula Exponential decay functions Exponential function Exponential growth functions Geometric sequence recursive formula

Lesson 9-6 **Recursive Formulas**	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. **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.5 -** Interpret the parameters in a linear or exponential function in terms of a context.			
Module 10				
Module 10: Polynomials **Lesson 10-1** **Adding and Subtracting Polynomials** **Lesson 10-2** **Multiplying Polynomials by Monomials**	**A.SSE.1a -** Interpret parts of an expression, such as terms, factors, and coefficients. **A.SSE.2 -** Use the structure of an expression to identify ways to rewrite it. **A.APR.1 -** Understand that polynomials form a system analogous to the integers, namely,	How can you perform operations on polynomials and use them to represent real-world situations?	- add and subtract polynomials by combining like terms. - multiply polynomials by monomials. - multiply polynomials by polynomials. - multiply binomials by applying special patterns.	Binomial Degree of a monomial Degree of polynomial Difference of two squares Factoring Factoring by grouping

Lesson 10-3 **Multiplying Polynomials** **Lesson 10-4** **Special Products** **Lesson 10-5** **Using the Distributive Property** **Lesson 10-6** **Factoring Quadratic Trinomials** **Lesson 10-7** **Factoring Special Products**	they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **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.		- factor polynomials by using the Distributive Property. - factor trinomials into two binomials. - factor polynomials by applying special patterns.	Leading coefficient Perfect square trinomials Polynomial Prime polynomial Quadratic expression Standard form of a polynomial Trinomial
Module 11				
Module 11: Quadratic Functions **Lesson 11-1** **Graphing Quadratic Functions** **Lesson 11-2** **Transformations of Quadratic Functions** **Lesson 11-3** **Solving Quadratic Equations by graphing** **Lesson 11-4** **Solving Quadratic Equations by factoring** **Lesson 11-5**	**A.SSE.1a** Interpret parts of an expression, such as terms, factors, and coefficients. **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.CED.1 -** Create equations and inequalities in one variable and use them to solve problems. **A.CED.2 -** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Why is it helpful to have different methods to analyze quadratic functions and solve quadratic equations?	- analyze and graph quadratic functions. - identify the effects of transformations of the graphs of quadratic functions. - write quadratic equations and solve them by graphing. - solve quadratic equations by factoring and by using the Square Root Property. - solve quadratic equations by completing the square. - solve quadratic equations by using the Quadratic Formula. - solve systems of linear and quadratic equations. - model data with linear, exponential, and quadratic functions.	Axis of symmetry Coefficient of determination Completing the square Curve fitting Discriminant Double root Maximum Minimum Parabola Quadratic equation Quadratic function Standard form of a quadratic function Vertex form

Solving Quadratic Equations by Completing the Square **Lesson 11-6** **Solving Quadratic Equations by Using the Quadratic Formula** **Lesson 11-7** **Solving Systems of Linear and Quadratic Equations** **Lesson 11-8** **Modeling and Curve Fitting** **Lesson 11-9** **Combining Functions**	**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.4 -** Solve quadratic equations in one variable. **A.REI.7 -** Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically **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). **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.7a -** Graph linear and quadratic functions and show intercepts, maxima, and minima.		- combine standard function types.	

	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.9 -** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). **F.BF.1b -** Combine standard function types using arithmetic operations **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. **F.LE.1 -** Distinguish between situations that can be modeled with linear functions and with exponential functions. **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.			

	S.ID.6a - Fit a function to the data; use functions fitted to data to solve problems in the context of the data.			
Module 12				
Module 12: Statistics **Lesson 12-1** **Measures of Center** **Lesson 12-2** **Representing Data** **Lesson 12-3** **Using Data** **Lesson 12-4** **Measures of Spread** **Lesson 12-5** **Distributions of Data** **Lesson 12-6** **Comparing Sets of Data** **Lesson 12-7** **Summarizing Categorical Data**	**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. **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.	How do you summarize and interpret data?	- represent sets of data using measures of center and percentiles. - represent data using dot plots, histograms, and bar graphs. - analyze data collection and representation methods to determine bias or identify misleading information. - represent sets of data using measures of spread. - analyze the shapes of distributions to determine appropriate statistics and identify extreme data points. - use statistics appropriate to the shapes of the distributions to compare the measures of center and spread of two data sets. - summarize and interpret categorical data using frequency tables.	Bar graphs Bias Box plot Categorical data Conditional relative frequency Distribution Do plot Extreme values Five number summary Histogram Interquartile range Joint frequencies Linear transformation Lower quartile Measurement data Measures of center Median Measures of spread Negatively skewed Distribution Outlier Percentile Population Positively skewed distribution Relative frequency