Trinity Area School District
Template for Curriculum Mapping

Course: Algebra 2 Honors **Grades: 8-12**	**Overview of Course** (Briefly describe what students should understand and be able to do as a result of engaging in this course)**:** Students will review basic concepts and properties of real numbers including absolute values and solving and graphing one-variable equations and inequalities. They will study relations and linear, quadratic, polynomial, and radical functions through graphing, tables, and algebraic methods as well as a unit on probability.

Overarching Big Ideas, Enduring Understandings, and Essential Questions
(These "spiral" throughout the entire curriculum.)

Big Idea	**Standard(s) Addressed**	**Enduring Understanding(s)**	**Essential Question(s)**
Variable	**A1.1.1.3.1** Simplify/evaluate expressions involving properties/laws of exponents, roots, and/or absolute values to solve problems. **A1.1.2.1.1** Write, solve, and/or apply a linear equation (including problem situations). **A2.1.3.2.2** Use algebraic processes to solve a formula for a given variable. **A1.1.3.1.1** Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities).	Quantities are used to form expressions, equations, and inequalities. An expression refers to a quantity by does not make a statement about it. An equation (or an inequality) is a statement about the quantities it mentions. Using variables in place of numbers in equations (or inequalities) allows the statement of relationships among numbers that are unknown or unspecified.	How do variables help you model real-world situations?
Properties	**A1.1.1.3.1** Simplify/evaluate expressions involving properties/laws of exponents, roots, and/or absolute values to solve problems. **A1.1.2.1.1** Write, solve, and/or apply a linear equation (including problem situations). **A2.1.3.2.2** Use algebraic processes to solve a formula for a given variable. **A1.1.3.1.1** Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities).	All of the facts of arithmetic and algebra follow from certain properties.	How can you use the properties of real numbers to simplify algebraic expressions?
Solving Equations and Inequalities	**A1.1.2.1.1** Write, solve, and/or apply a linear equation (including problem situations).	Solving an equation is the process of rewriting the equation to make what it says about its variable(s) as simple as possible. Properties of	How do you solve an equation or inequality? How are the properties of equality used in the solution of a system of equations?

	A1.1.2.2.1 Write and/or solve a system of linear equations (including problem situations) using graphing, substitution, and/or elimination. **A1.1.2.2.2** Interpret solutions to problems in the context of the problem situation. **A1.1.3.1.1** Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities). **A1.1.3.1.2** Identify or graph the solution set to a linear inequality on a number line. **A1.1.3.2.1** Write and/or solve a system of linear inequalities using graphing. **A1.1.3.2.2** Interpret solutions to problems in the context of the problem situation. **A2.1.3.1.1** Write and/or solve quadratic equations (including factoring and using the Quadratic Formula). **A2.1.3.1.2** Solve equations involving rational and/or radical expressions.	numbers and equality can be used to transform an equation (or inequality) into equivalent, simpler equations (or inequalities) in order to find solutions. Useful information about equations and inequalities (including solutions) can be found by analyzing graphs or tables. The numbers and types of solutions vary predictably, based on the type of equation.	How are the real solutions of a quadratic equation related to the graph of the related quadratic function? For a polynomial equation, how are factors and roots related? When you square each side of an equation, how is the resulting equation related to the original?
Equivalence	**A2.2.2.1.4** Translate from one representation of a function to another (graph, table, and equation). **A1.1.2.2.1** Write and/or solve a system of linear equations (including problem situations) using graphing, substitution, and/or elimination. **A2.2.2.1.1** Create, interpret, and/or use the equation, graph, or table of a polynomial function (including quadratics). **A2.2.1.1.4** Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function. **A2.2.2.1.1** Create, interpret, and/or use the equation, graph, or table of a polynomial function (including quadratics). **A2.1.2.1.2** Simplify/evaluate expressions involving positive and negative exponents	A single quantity may be represented by many different expressions. The facts about a quantity may be expressed by many different equations (or inequalities).	Which form of a linear equation should be used under what circumstances? How does writing equivalent equations help you solve a system of equations? What are the advantages of a quadratic function in vertex form? in standard form? For a polynomial function, how are factors, zeros, and x-intercepts related? To simplify the nth root of an expression, what must be true about the expression?

	and/or roots (may contain all types of real numbers – exponents should not exceed power of 10).		
Functions	**A1.2.1.1.2** Determine whether a relation is a function, given a set of points or a graph. **A2.2.1.1.4** Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function. **A2.2.2.1.1** Create, interpret, and/or use the equation, graph, or table of a polynomial function (including quadratics). **A2.2.2.1.3** Determine, use, and/or interpret minimum and maximum values over a specified interval of a graph of a function. **A2.2.2.1.4** Translate from one representation of a function to another (graph, table, and equation). **A2.2.2.2.1** Identify or describe the effect of changing parameters within a family of functions.	A function is a relationship between variables in which each value of the input variable is associated with a unique value of the output variable. Functions can be represented in a variety of ways, such as graphs, tables, equations, or words. Each representation is particularly useful in certain situations. Some important families of functions are developed through transformations of the simplest form of the function.	How do you use transformations to help graph absolute value functions? How does representing functions graphically help you solve a system of equations? How is any quadratic function related to the parent quadratic function $y = x^2$? What does the degree of a polynomial tell you about its related polynomial function?
Modeling	**A1.1.2.1.3** Interpret solutions to problems in the context of the problem situation.	Many real-world mathematical problems can be represented algebraically. These representations can lead to algebraic solutions. A function that models a real-world situation can then be used to make estimates or predictions about future occurrences.	How can you model data with a linear function?
Probability	**A1.2.3.1.1** Calculate and/or interpret the range, quartiles, and interquartile range of data. **A1.2.3.2.1** Estimate or calculate to make predictions based on a circle, line, bar graph, measures of central tendency, or other representations. **A1.2.3.2.2** Analyze data, make predictions, and/or answer questions based on displayed data (box-and-whisker plots, stem-and-leaf	Probability expresses the likelihood that a particular event will occur. Data can be used to calculate an experimental probability, and mathematical properties can be used to determine a theoretical probability. Either experimental ore theoretical probability can be used to make predictions or decisions about future events. Various counting methods can be used to develop theoretical probabilities.	What is the difference between experimental and theoretical probability? How are measures of central tendency used to describe data? What is the difference between a permutation and a combination?

	plots, scatter plots, measures of central tendency, or other representations). **A1.2.3.3.1** Find probabilities for compound event (e.g., find probability of red and blue, find probability of red or blue) and represent as a fraction, decimal, or percent. **A2.2.3.2.1** Use combinations, permutations, and the fundamental counting principle to solve problems involving probability. **A2.2.3.2.3** Use probability for independent, dependent, or compound events to predict outcomes.		

Big Ideas, Enduring Understandings, and Essential Questions Per Unit of Study
(These do NOT "spiral" throughout the entire curriculum, but are specific to each unit.)

Month of Instruction	**Title of Unit**	**Big Idea(s)**	**Standard(s) Addressed**	**Enduring Understanding(s)**	**Essential Question(s)**	**Common Assessment(s)***	**Common Resource(s)* Used**
August - September	Tools of Algebra	Variable, Properties, Solving Equations & Inequalities	**A1.1.1.1.1** Compare and/or order any real numbers. **A1.1.1.3.1** Simplify/ evaluate expressions involving properties/ laws of exponents, roots, and/or absolute values to solve problems. **A1.1.2.1.1** Write, solve, and/or apply a linear equation (including problem situations). **A2.1.3.2.2** Use algebraic processes to	The set of real numbers has several subsets related in particular ways. You can represent some mathematical phrases and real-world quantities using algebraic expressions. You can use the properties of equality and inverse operations to solve equations. Sometimes, no value of the variable makes an equation true.	How do variables help you model real-world situations? How can you use the properties of real numbers to simplify algebraic expressions? How do you solve an equation or inequality?	Chapter Test All Mid Chapter Quizzes **Terminology:** absolute value additive inverse algebraic expression coefficient compound inequality evaluate extraneous solution multiplicative inverse opposite reciprocal	Algebra 2, Prentice Hall Mathematics, 2007 https://www.pearsonsuccessnet.com

			solve a formula for a given variable. **A1.1.3.1.1** Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities). **A1.1.3.1.2** Identify or graph the solution set to a linear inequality on a number line.	For identities, all values of the variable make the equation true. Just as you use properties of equality to solve equations, you can use properties of inequality to solve inequalities. An absolute value quantity is nonnegative. Since opposites have the same absolute value, an absolute value equation can have two solutions.		term variable variable expression	
September-October	Functions, Equations, & Graphs	Equivalence, Functions, Modeling	**A1.1.2.1.3** Interpret solutions to problems in the context of the problem situation. **A1.2.1.1.2** Determine whether a relation is a function, given a set of points or a graph. **A1.2.2.1.1** Identify, describe, and/or use constant rates of change. **A1.2.2.1.2** Apply the concept of linear rate of change (slope) to solve problems. **A1.2.2.1.3** Write or identify a linear equation when given the graph of the line,	A pairing of items from two sets is special if each item from one set pairs with exactly one item from the second set. Consider a line in the coordinate plane. If you move from any point on the line to any other point on the line, the ratio of the vertical change to the horizontal change is constant. That constant ratio describes the slope of the line. The slopes of two lines in the same plane indicate how the lines are related.	Which form of a linear equation should be used under what circumstances? How do you use transformations to help graph absolute value functions? How can you model data with a linear function?	Chapter Test All Mid Chapter Quizzes **Terminology:** absolute value function constant of variation dependent variable direct variation domain function independent variable linear equation linear function linear inequality parent function point-slope form range	Algebra 2, Prentice Hall Mathematics, 2007 **https://www.pearsonsuccessnet.com**

			two points on the line, or the slope and a point on the line. **A1.2.2.1.4** Determine the slope and/or y-intercept represented by a linear equation or graph. **A2.2.1.1.3** Determine the domain, range, or inverse of a relation. **A2.2.2.1.4** Translate from one representation of a function to another (graph, table, and equation). **A2.2.2.2.1** Identify or describe the effect of changing parameters within a family of functions. **A2.2.3.1.1** Draw, identify, find, interpret, and/or write an equation for a regression model (lines and curves of best fit) for a scatter plot. **A2.2.3.1.2** Make predictions using the equations or graphs of regression models (lines and curves of best fit) of scatter plots.	Some quantities are in a relationship where the ratio of corresponding values is constant. Sometimes it is possible to model data from a real-world situation with a linear equation. You can then use the equation to draw conclusions about the situation. Just as the absolute value of x is its distance from 0, the absolute value of f(x), or |f(x)|, gives the distance from the line y = 0 for each value of f(x). There are sets of functions, called families, in which each function is a transformation of a special function call the parent. Graphing an inequality in two variables is similar to graphing a line. The graph of a linear inequality contains all points on one side of the line and may or may not include the points on the line.		relation slope slope-intercept form standard form translation vertical-line test x-intercept y-intercept	

October-November	Linear Systems	Functions, Equivalence, Solving Equations & Inequalities	**A1.1.2.2.1** Write and/or solve a system of linear equations (including problem situations) using graphing, substitution, and/or elimination. **A1.1.2.2.2** Interpret solutions to problems in the context of the problem situation. **A1.1.3.2.1** Write and/or solve a system of linear inequalities using graphing. **A1.1.3.2.2** Interpret solutions to problems in the context of the problem situation.	To solve a system of equations, find a set of values that replace the variables in the equations and make each equation true. You can solve a system of equations by writing equivalent systems until the value of one variable is clear. Then substitute to find the value(s) of the other variable(s). You can solve a system of inequalities in more than one way. Graphing the solution is usually the most appropriate method. The solution is the set of all points that are solutions of each inequality in the system. Some real-world problems involve multiple linear relationships. Linear programming accounts for all of these linear relationships and gives the solution to the problem. To solve systems of three equations in three variables, you can use some of the same algebraic methods you	How does representing functions graphically help you solve a system of equations? How does writing equivalent equations help you solve a system of equations? How are the properties of equality used in the solution of a system of equations?	Chapter Test All Mid Chapter Quizzes **Terminology:** constraints coordinate space dependent system equivalent systems feasible region inconsistent system independent system linear programming linear system objective function system of equations	Algebra 2, Prentice Hall Mathematics, 2007 https://www.pearsonsuccessnet.com

				used to solve systems of two equations in two variables.			
November-December	Quadratic Equations & Functions	Equivalence, Functions, and Solving Equations and Inequalities	**A2.1.1.1.1** Simplify/write square roots in terms of i. **A2.1.1.1.2** Simplify/evaluate expressions involving powers of i. **A2.1.1.2.1** Add and subtract complex numbers. **A2.1.1.2.2** Multiply and divide complex numbers. **A2.1.3.1.1** Write and/or solve quadratic equations (including factoring and using the Quadratic Formula). **A2.2.1.1.4** Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function. **A2.2.2.1.1** Create, interpret, and/or use the equation, graph, or table of a polynomial function (including quadratics). **A2.2.2.1.3** Determine, use, and/or interpret minimum and maximum values over a	Three noncollinear points, no two of which are in line vertically, are on the graph of exactly one quadratic function. For any quadratic function $f(x)= ax^2 + bx + c$, the values of a, b, and c, provide key information about its graph. The graph of any quadratic function is a transformation of the graph of the parent quadratic function $y = x^2$. You can factor many quadratic trinomials ($ax^2 + bx + c$) into products of two binomials. To find the zeros of a quadratic function $y = ax^2 + bx + c$, solve the related quadratic equation $0 = ax^2 + bx + c$. The complex numbers are based on a number whose square is -1. Completing a perfect square trinomial allows you to factor the	What are the advantages of a quadratic function in vertex form? In standard form? How is any quadratic function related to the parent quadratic function $y = x^2$? How are the real solutions of a quadratic equation related to the graph of the related quadratic function?	Chapter Test All Mid Chapter Quizzes Terminology: axis of symmetry completing the square complex number difference of two squares discriminant factoring i imaginary number parabola perfect square trinomial quadratic formula quadratic function standard form of a quadratic function vertex form of a quadratic function zero of a function Zero Product Property	Algebra 2, Prentice Hall Mathematics, 2007 https://www.pearsonsuccessnet.com

			specified interval of a graph of a function. **A2.2.2.2.1** Identify or describe the effect of changing parameters within a family of functions. **A2.2.3.1.1** Draw, identify, find, interpret, and/or write an equation for a regression model (lines and curves of best fit) for a scatter plot. **A2.2.3.1.2** Make predictions using the equations or graphs of regression models (lines and curves of best fit) of scatter plots.	completed trinomial as the square of a binomial. You can solve a quadratic equation $ax^2 + bx + c = 0$ in more than one way. In general, you can find a formula that gives values of x in terms of a, b, and c.			
January-February	Polynomials and Polynomial Functions	Functions, Equivalence, Solving Equations and Inequalities, & Probability	**A2.2.1.1.4** Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function. **A2.2.2.1.1** Create, interpret, and/or use the equation, graph, or table of a polynomial function (including quadratics). **A2.2.2.1.3** Determine, use, and/or interpret minimum and maximum values over a	A polynomial function has distinguishing "behaviors." You can look at its algebraic form and know something about its graph. You can look at its graph and know something about its algebraic form. Finding the zeros of a polynomial function will help you factor the polynomial, graph the function, and solve the related polynomial equation.	What does the degree of a polynomial tell you about its related polynomial function? For a polynomial function, how are factors, zeros, and x-intercepts related? For a polynomial equation, how are factors and roots related?	Chapter Test All Mid Chapter Quizzes **Terminology:** conjugates multiplicity Pascal's Triangle polynomial function standard form of a polynomial synthetic division fundamental counting principle permutation combination	Algebra 2, Prentice Hall Mathematics, 2007 https://www.pearsonsuccessnet.com

			specified interval of a graph of a function. **A2.2.3.1.1** Draw, identify, find interpret, and/or write an equation for a regression model (lines and curves of best fit) for a scatter plot. **A2.2.3.1.2** Make predictions using the equations or graphs of regression models (lines and curves of best fit) of scatter plots.	You can divide polynomials using steps that are similar to the long division steps that you use to divide whole numbers. If (x – a) is a factor of a polynomial, then the polynomial has value 0 when x = a. If a is a real number, then the graph of the polynomial has (a, 0) as an x-intercept. You can use a pattern of coefficients and the pattern a^n, a^{n-1} b, a^{n-2} b^2,…,a^2b^{n-2},ab^{n-1}, b^n to write the expansion of $(a + b)^n$.			
March-April	Radical and Rational Exponents	Equivalence, Solving Equations & Inequalities, Functions	**A2.1.2.1.1** Use exponential expressions to represent rational numbers. **A2.1.2.1.2** Simplify/evaluate expressions involving positive and negative exponents and/or roots (may contain all types of real numbers – exponents should not exceed power of 10). **A2.1.2.1.3** Simplify/evaluate expressions involving	Corresponding to every power, there is a root. For example, just as there are squares (second powers), there are square roots. Just as there are cubes (third powers), there are cube roots, and so on. You can simplify a radical expression when the exponent of one factor of the radicand is a multiple of the radical's index.	To simplify the nth root of an expression, what must be true about the expression? When you square each side of an equation, how is the resulting equation related to the original?	Chapter Test All Mid Chapter Quizzes **Terminology:** like radicals nth root principal root radical equation radical function radicand rational exponent rationalize the denominator square root equation square root function	Algebra 2, Prentice Hall Mathematics, 2007 https://www.pearsonsuccessnet.com

			multiplying with exponents, powers of powers, and powers of products. (Limit to rational exponents.) **A2.1.3.1.2** Solve equations involving rational and/or radical expressions.	You can combine like radicals using properties of real numbers. You can write a radical expression in an equivalent form using a fractional (rational) exponent instead of a radical sign. Solving a square root equation may require that you square each side of the equation. This can introduce extraneous solutions. You can add, subtract, multiply, and divide functions based on how you perform these operations for real numbers. One difference, however, is that you must consider the domain of each function.			
April-June	Exponential & Logarithmic Functions	Equivalence, Solving Equations & Inequalities, Functions	**A2.1.2.1.4** Simplify or evaluate expressions involving logarithms and exponents **A2.1.3.1.3** Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms).	When rewriting an exponential equation in log form or a log equation in exponential form, the base of the logarithm is the same as the base of the exponent. The rate of exponential growth or decay is the	How do you use exponential and logarithmic functions to model situations and solve problems? How are properties of exponents and logarithms similar? How are they different?	Chapter Test All Mid Chapter Quizzes **Terminology:** Logarithms Exponential Models Exponential Growth Exponential Decay Inverse Common Logarithm	Algebra 2, Prentice Hall Mathematics, 2007 https://www.pearsonsuccessnet.com

			A2.1.3.1.4 Write, solve, and/or apply linear or exponential growth or decay (including problem situations). **A2.1.3.2.2** Use algebraic processes to solve a formula for a given variable (e.g., solve d = rt for r). **A2.2.1.1.3** Determine the domain, range, or inverse of a relation. **A2.2.1.1.4** Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increase/decrease, intercepts, zeros, and asymptotes). **A2.2.2.1.2** Create, interpret, and/or use the equation, graph, or table of an exponential or logarithmic function (including common and natural logarithms).	ratio between two consecutive output values in an exponential function. Exponential models are useful for representing situations in which the rate increases by the same percent for each period of time, i.e. compound interest. A logarithmic function is the inverse of an exponential function.	How can you use change of base formula to solving a logarithmic equation?	Natural Logarithm Change of Base Formula	

			A2.2.2.1.4 Translate a polynomial, exponential, or logarithmic function from one representation of a function to another (graph, table, and equation).				

***** Some teachers may need to think about the assessments and resources used in order to determine the Big Ideas, Enduring Understandings, and Essential Questions embedded in their courses. At this point in your curriculum mapping, you might want to ignore the "Common Assessments" and "Common Resources Used" columns. However, you may use them if you wish.

November-December	Probability (Part of Chapter 1)	Probability	**A1.2.3.1.1** Calculate and/or interpret the range, quartiles, and interquartile range of data. **A1.2.3.2.1** Estimate or calculate to make predictions based on a circle, line, bar graph, measures of central tendency, or other representations. **A1.2.3.2.2** Analyze data, make predictions, and/or answer questions based on displayed data (box-and-whisker plots, stem-and-leaf plots, scatter plots, measures	You can use multiplication to quickly count the number of ways certain things can happen. The probability of an impossible event is 0 (or 0%). The probability of a certain event is 1 (or 100%). Otherwise, the probability of an event is a number between 0 and 1 (or a percent between 0% and 100%). To find the probability of two events occurring together, you have to decide whether one event occurring affects the other event.	What is the difference between experimental and theoretical probability? How are measures of central tendency used to describe data?	Chapter Test All Mid Chapter Quizzes **Terminology:** statistics measures of central tendency bimodal outlier range interquartile range quartiles percentile mean median mode probability simulation sample space	Algebra 2, Prentice Hall Mathematics, 2007 **https://www.pearsonsuccessnet.com**

			of central tendency, or other representations). **A1.2.3.3.1** Find probabilities for compound event (e.g., find probability of red and blue, find probability of red or blue) and represent as a fraction, decimal, or percent. **A2.2.3.2.1** Use combinations, permutations, and the fundamental counting principle to solve problems involving probability. **A2.2.3.2.3** Use probability for independent, dependent, or compound events to predict outcomes.	Conditional probability exists when two events are dependent. You can describe and compare sets of data using various statistical measures, depending on what characteristics you want to study.		theoretical probability dependent events independent events mutually exclusive events conditional probability	